

FIRST CENTURY
OF
NATIONAL EXISTENCE;
THE UNITED STATES

AS
THEY WERE AND ARE:

GIVING

THE PROGRESSIVE DEVELOPMENT OF MINERAL WEALTH, INCLUDING NOT ONLY THE PRECIOUS AND THE USEFUL METALS, BUT COAL, PETROLEUM, AND THE VARIOUS ALKALIES AND EARTHS IN USE; THE PUBLIC LANDS, THEIR SALES IN EACH YEAR, LAND GRANTS TO ROADS, RAILROADS, STATE, AND EDUCATIONAL PURPOSES, THEIR RAPID SETTLEMENT, THE FORMATION OF STATES AND TERRITORIES, FOUNDING OF CITIES AND COMMERCIAL CENTERS; INTERNAL TRADE; IMMIGRATION, ITS INCREASING TIDE AND THE REGIONS MOSTLY SOUGHT BY IMMIGRANTS; BANKING, ITS SUCCESSIVE SYSTEMS AND CHANGES; FIRE, LIFE, ACCIDENT, AND OTHER INSURANCE, WITH STATISTICS; LITERATURE AND AUTHORS; BOOKS, PERIODICALS, AND NEWSPAPERS; THE FINE ARTS, PAINTING, SCULPTURE, ARCHITECTURE, AND ENGRAVING; DOMESTIC LIFE, DWELLINGS, FURNITURE, FOOD, COSTUMES, &c.; TELEGRAPH; EDUCATION, HIGHER AND ELEMENTARY, LIBRARIES, MUSEUMS, AND SCIENTIFIC COLLECTIONS; BENEVOLENT AND HUMANITARIAN INSTITUTIONS, &c.

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GIVING

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HARTFORD, CONN.: Δ

PUBLISHED BY L. STEBBINS.
FRANCIS DEWING & CO., SAN FRANCISCO, CAL.

1874.

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181, Young Samuel dear, the Lord did fear.....	415	250, Camp Meeting.....	
182, Young Timothy learnt Sin to fly.....	415	251, Baptism by Immersion, (Steel Plate)....	
183, Vasthi for Pride was set aside.....	415	252, Baptism by Sprinkling. ".....	
184, Whales in the Sea.....	415	253, South Church, New Britain, Ct.....	
185, Xerxes did die.....	415	254, First Church built in Connecticut.....	
186, While Youth doth cheer, &c.....	415	255, Ancient Dutch Church in Albany.....	
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MINING INDUSTRY OF THE UNITED STATES.

INTRODUCTORY REMARKS.

THE mineral wealth of the American colonies does not appear to have been an object of much interest to the early settlers. Congregated near the coast, they were little likely to become acquainted with many of the mineral localities, most of which are in the interior, in regions long occupied by the Indian tribes. The settlers, moreover, probably possessed little knowledge of mining, and certainly lacked capital which they could appropriate in this direction. Some discoveries, however, were made by them very soon after their settlement, the earliest of which were on the James river, in Virginia. Beverly, in his "History of the Present State of Virginia," published in London in 1705, makes mention of iron works which were commenced on Falling Creek, and of glass-houses which were about to be constructed at Jamestown just previous to the great massacre by the Indians, in 1622. This undertaking at Falling Creek is referred to by other historians, as by Stith, in his "History of Virginia" (1753), p. 279. A Captain Nathaniel Butler, it appears, presented to the king, in 1623, a very disparaging account of the condition of the colony, mentioning, among other matters, that "the Iron Works were utterly wasted, and the People dead; the Glass Furnaces at a stand, and in small Hopes of proceeding." The committee of the company, in their reply to this, affirm that "great Sums had been expended, and infinite Care and Diligence bestowed by the Officers and Company for setting forward various Commodities and Manufactures; as Iron Works," etc., etc. Salmon, in his "Modern History" (1746), vol. iii, pp. 439 and 468, refers to the statement of Beverly, mentioning that "an iron work was set up on Falling Creek, in James River, where they found the iron ore good, and had near brought that work to perfection. The iron proved reasonably good; but before they got into the body of the mine, the people were

cut off in that fatal massacre (of March, 1622), and the project has never been set on foot since, until of late; but it has not had its full trial." This author also refers to the representations of the Board of Trade to the House of Commons, in 1732, as containing notices of the iron works in operation in New England. From various reports of the governor of Massachusetts Bay and other officials of this colony, there appear to have been, in 1731, as many as six furnaces and nineteen forges for making iron in New England, as also a slitting mill and nail factory connected with it.

The first blast furnace in the colonies appears to have been built in 1702, by Lambert Despard, at the outlet of Mattakeeset pond, in Plymouth County, Massachusetts, and a number more were afterward set in operation to work the bog ores of that district. Their operations are described in the "Collections of the Massachusetts Historical Society" for 1804, by James Thacher, M. D., who was himself engaged in the manufacture. In Rhode Island and Providence Plantations, the same kinds of ore were found and worked at about the same period. Alexander gives the year 1715 as the epoch of blast furnaces in Maryland, Virginia, and Pennsylvania. These enterprises were regarded with great disfavor in the mother country. In 1719 an act was brought forward in the House of Lords, forbidding the erection of rolling or slitting mills in the American colonies, and in 1750 this was made a law.

In Connecticut, Governor Winthrop was much interested in investigating the character of the minerals about Haddam and Middletown. In 1651 he obtained a license giving him almost unlimited privileges for working any mines of "lead, copper, or tin, or any minerals; as antimony, vitriol, black lead, alum, salt, salt springs, or any other the like, * * * to enjoy forever said mines, with the lands, woods, timber, and water within two or three miles of said mines." And in 1661, another special grant

was made to him of any mines he might discover in the neighborhood of Middletown. It does not appear, however, that he derived any special advantage from these privileges, although he used to make frequent excursions to the different localities of minerals, especially to the Governor's Ring, a mountain in the north-west corner of East Had-dam, and spend three weeks at a time there with his servant, engaged, as told by Governor Trumbull to President Styles, and recorded in his diary, in "roasting ores, assaying metals, and casting gold rings." John Winthrop, F.R.S., grandson of Governor Winthrop, was evidently well acquainted with many localities of different ores in Connecticut, and sent to the Royal Society a considerable collection of specimens he had made. It is supposed that among them Hatchett found the mineral columbite, and detected the new metal which he named columbium. At Middletown, an argentiferous lead mine was worked, it is supposed, at this period, by the Winthrops, and the men employed were evidently skilful miners. When the mine was reopened in 1852, shafts were found well timbered and in good preservation, that had been sunk to the depth of 120 feet, and, with the other workings, amounted in all to 1,500 feet of excavation. The oldest American charter for a mining company was granted in 1709, for working the copper ores at Simsbury, Connecticut. Operations were carried on here for a number of years, the ore raised being shipped to England, and a similar mining enterprise was undertaken in 1719, at Belleville, in New Jersey, about six miles from Jersey City. The products of the so-called Schuyler mine at this place amounted, before the year 1731, to 1,386 tons of ore, all of which were shipped to England. At this period (1732) the Gap mine, in Lancaster county, Pennsylvania, was first opened and worked for copper, and about the middle of the century various other copper mines were opened in New Jersey; also, the lead mine at Southampton, Mass., and the cobalt mine at Chatham, Conn. In 1754 a lead mine was successfully worked in Wythe county, in south-western Virginia, and this is still productive. It is probable that, by reason of the higher value of copper at that period, and the lower price paid for labor than at present, some of the copper mines may have proved profitable to work, though it is certain this has not been the case with them of late years.

The existence of copper in the region about Lake Superior was known, from the reports of the Jesuit missionaries, in 1660, and one or two unsuccessful attempts were made to work it during the last century by parties of Englishmen. The lead mines of the upper Mississippi, discovered by Le Sueur in his exploring voyage up the river in 1700 and 1701, were first worked by Dubuque, a French miner, in 1788, upon the tract of land now occupied by the city in Iowa bearing his name.

Such, in general, was the extent to which this branch of industry had been carried up to the close of the last century. The only coal mines worked were some on the James river, twelve miles above Richmond, and the capacity of these for adding to the wealth of the country was not by any means appreciated. The gold mines were entirely unknown, and the dependence of the country upon Great Britain for the supply of iron had so checked the development of this branch of manufacture, that comparatively nothing was known of our own resources in the mines of this metal. The most important establishments for its manufacture were small blast furnaces, working bog ores, and the bloomeries of New York and New Jersey, making bar iron direct from the rich magnetic ores.

The progress of the United States in these branches will be traced in the succeeding chapters, one of which will be devoted to each of the principal metals.

CHAPTER I.

IRON.

THE early history of the iron manufacture in the American colonies has been noticed in the introductory remarks which precede this chapter. Since the year 1750 the restrictions imposed upon the business by the mother country had limited the operations to the production of pig iron and castings, and a few blast furnaces were employed in New England and the middle Atlantic states. A considerable portion of the pig iron was exported to Great Britain, where it was admitted free of duty, and articles of wrought-iron and steel were returned from that country. In 1771 the shipment of pig iron from the colonies amounted to 7,525 tons. By the sudden cessation of commercial relations

on the breaking out of the war, the country was thrown upon its own resources, but was illy prepared to meet the new and extraordinary demands for iron. The skill, experience, and capital for this business were all alike wanting, and even the casting of cannon was an undertaking that few of the furnace masters were prepared to venture upon. The bog ores found in Plymouth county, Mass., together with supplies from New Jersey, sustained ten furnaces; and in Bridgewater, cannon were successfully cast and bored by Hon. Hugh Orr, for the supply of the army. They were also made at Westville, Conn., by Mr. Elijah Bachus, who welded together bars of iron for the purpose. The Continental Congress, also, was forced to establish and carry on works for furnishing iron and steel, and in the northern part of New Jersey, the highlands of New York, and the valley of the Housatonic in Connecticut, they found abundance of rich ores, and forests of the best wood for the charcoal required in the manufacture. At their armory at Carlisle, Pa., the first trials of anthracite for manufacturing purposes were made in 1775. But the condition of the country was little favorable for the development of this branch of industry, and after the war, without capital, a currency, or facilities of transportation, the iron business long continued of little more than local importance. The chief supplies were again furnished from the iron works of Great Britain, the establishment of which had in great part been owing to the restrictions placed upon the development of our own resources; and while that country continued to protect their own interest by prohibitory duties that for a long period excluded all foreign competition, the iron interest of the United States languished under a policy that fostered rather the carrying trade between the two countries than the building up of highly important manufactories, and the establishment around them of permanent agricultural settlements through the home market they should secure. Hence it was that the manufacture in Great Britain was rapidly accelerated, improved by new inventions, strengthened by accumulated capital, and sustained by the use of mineral coal for fuel, almost a century before we had learned in the discouraging condition of the art, that this cheap fuel, mines of which were worked near Richmond in Virginia, before 1790, could be advantageously employed in the manufacture. The natural ad-

vantages possessed by Great Britain powerfully co-operated with her wise legislation; and as her rich deposits of iron ore and coal were developed in close juxtaposition, and in localities not far removed from the coast, the iron interest became so firmly established that no nation accessible to her ships could successfully engage in the same pursuit, until, by following the example set by Great Britain, its own mines and resources might be in like manner developed. Thus encouraged and supported, the iron interest of Great Britain has prospered at the expense of that of all other nations, till her annual production amounts to more than one-half of the seven millions or eight millions of tons produced throughout the world; and the products of her mines and furnaces have, until quite recently, been better known, even in the extreme western states, where the cost of "Scotch pig iron" has been more than doubled by the transportation, than has that of the rich ores of these very states. And thus it is the annual production of the United States has only recently reached 2,000,000 tons, notwithstanding the abundance and richness of her mines, both of iron ores and of coal, and the immense demands of iron for her own consumption. So great are the advantages she possesses in the quality of these essential materials in the production of iron, that according to the statement of an able writer upon this subject, who is himself largely engaged in the manufacture, less than half the quantity of raw materials is required in this country to the ton of iron, that is required in Great Britain, "thus economizing labor to an enormous extent. In point of fact, the materials for making a ton of iron can be laid down in the United States at the furnace with less expenditure of human labor than in any part of the known world, with the possible exception of Scotland." ("On the Statistics and Geography of the Production of Iron," by Abram S. Hewitt, N. Y., 1856, p. 20). The tables presented by this writer, of the annual production, show striking vicissitudes in the trade, which is to be accounted for chiefly by the fluctuations in prices in the English market depressing or encouraging our own manufacture, and by the frequent changes in our tariff.

"In 1810 the production of iron, entirely charcoal, was 54,000 tons. In 1820, in consequence of the commercial ruin which swept over the country just before, the busi-

ness was in a state of comparative ruin, and not over 20,000 tons were produced.

In 1828 the product was 130,000 tons.

" 1829	"	"	"	142,000	"
" 1830	"	"	"	165,000	"
" 1831	"	"	"	191,000	"
" 1832	"	"	"	200,000	"
" 1840	"	"	"	347,000	"
" 1842	"	"	"	215,000	"
" 1845	"	"	"	486,000	"
" 1846	"	"	"	765,000	"
" 1847	"	"	"	800,000	"
" 1852	"	"	"	564,000	"
" 1854	"	"	"	716,674	"
" 1855	"	"	"	754,178	"
" 1856	"	"	"	874,423	"
" 1857	"	"	"	798,157	"
" 1858	"	"	"	705,094	"
" 1859	"	"	"	840,427	"
" 1860	"	"	"	913,774	"
" 1861	"	"	"	731,564	"
" 1862	"	"	"	787,662	"
" 1863	"	"	"	947,604	"
" 1864	"	"	"	1,135,497	"
" 1865	"	"	"	931,582	"
" 1866	"	"	"	1,350,943	"
" 1867	"	"	"	1,461,626	"
" 1868	"	"	"	1,103,500	"
" 1869	"	"	"	1,916,641	"
" 1870	"	"	"	2,000,000	"

There was a protective duty on iron from 1825 to 1837, but none from 1837 to 1843. From 1843 to 1848 there was protection, but none from 1848 to 1863. The high protective duty was modified in 1866, and since that time the protection has been more and more moderate as the premium on gold declined. The tariff of 1870 reduced the duty from nine to seven dollars per ton on pig iron, and from eight to six dollars per ton on scrap iron.

Until the year 1840, charcoal had been the only fuel used in the manufacture of iron; and while it produced a metal far superior in quality to that made with coke, the great demands of the trade were for cheap irons, and the market was chiefly supplied with these from Great Britain. The introduction of anthracite for smelting iron ores in 1840 marked a new era in the manufacture, though its influence was not sensibly felt for several years.

MATERIALS EMPLOYED IN THE MANUFACTURE.

Before attempting to exhibit the resources of the United States for making iron, and the methods of conducting the manufacture, it is well to give some account of the materials employed, and explain the conditions upon which this manufacture depends. Three elements are essential in the great branch of the business—that of producing pig iron,

viz: ores, fuel to reduce them, and a suitable flux to aid the process by melting with and removing the earthy impurities of the ore in a freely flowing, glassy cinder. The flux is usually limestone, and by a wise provision, evidently in view of the uses to which this would be applied, limestone is almost universally found conveniently near to iron ores; so also are stores of fuel commensurate with the abundance of the ores.

The principal ores are hematites, magnetic and specular ores, the red oxides of the secondary rocks, and the carbonates. Probably more than three-quarters of the iron made in the United States is from the first three varieties named, and a much larger proportion of the English iron is from the last—from the magnetic and specular ores none. Hematites, wherever known, are favorite ores. They are met with in great irregular-shaped deposits (apparently derived from other forms in which the iron was distributed), intermixed with ochres, clays, and sands, sometimes in scattered lumps and blocks, and sometimes in massive ledges; they also occur in beds interstratified among the mica slates. Although the deposits are regarded as of limited capacity, they are often worked to the depth of more than 100 feet; in one instance in Berks county, Penn., to 165 feet; and when abandoned, as they sometimes are, it is questionable whether this is not rather owing to the increased expenses incurred in continuing the enormous excavations at such depths, than from failure of the ore. Mines of hematite have proved the most valuable mines in the United States. At Salisbury, in Connecticut, they have been worked almost uninterruptedly for more than 100 years, supplying the means for supporting an active industry in the country around, and enriching generation after generation of proprietors. The great group of mines at Chestnut Hill, in Columbia county, Penn., and others in Berks and Lehigh counties in the same state, are of similar character.

The ore is a hydrated peroxide of iron, consisting of from 72 to 85 per cent. of peroxide of iron (which corresponds to about 50 to 60 per cent. of iron), and from 10 to 14 per cent. of water. Silica and alumina; phosphoric acid, and peroxide of manganese are one or more present in very small quantities; but the impurities are rarely such as to interfere with the production of very excellent iron, either for foundry or forge purposes—that is, for castings or bar iron. It is

easily and cheaply mined, and works easily in the blast furnace. On account of its deficiency in silica it is necessary to use a limestone containing this ingredient, that the elements of a glassy cinder may be provided, which is the first requisite in smelting iron; or the same end may be more advantageously attained by adding a portion of magnetic ore, which is almost always mixed with silica in the form of quartz; and these two ores are consequently very generally worked together—the hematites making two-thirds or three-quarters of the charge, and the magnetic ores the remainder.

Magnetic ore is the richest possible combination of iron, the proportion of which cannot exceed 72.4 per cent., combined with 27.6 per cent of oxygen. It is a heavy, black ore, compact or in coarse crystalline grains, and commonly mixed with quartz and other minerals. It affects the magnetic needle, and pieces of it often support small bits of iron, as nails. Such ore is the loadstone. It is obtained of various qualities; some sorts work with great difficulty in the blast furnace, and others are more easily managed and make excellent iron for any use; but all do better mixed with hematite. The magnetic ores have been largely employed in the ancient processes of making malleable iron direct from the ore in the open forge, the Catalan forge, etc., and at the present time they are so used in the bloomery fires. They are found in inexhaustible beds of all dimensions lying among the micaceous slates and gneiss rocks. These beds are sometimes so extensive that they appear to make up the greater part of the mountains in which they lie, and in common language the mountains are said to be all ore.

Specular ore, or specular iron, is so named from the shining, mirror-like plates in which it is often found. The common ore is sometimes red, steel gray, or iron black, and all these varieties are distinguished by the bright red color of the powder of the ore, which is that of peroxide of iron. Magnetic ore gives a black powder, which is that of a less oxidized combination. The specular ore thus contains less iron and more oxygen than the magnetic; the proportions of its ingredients are 70 parts in 100 of iron, and 30 of oxygen. Though the difference seems slight, the qualities of the two ores are quite distinct. The peroxide makes iron fast, but some sorts of it produce an inferior quality

of iron to that from the hematite and magnetic ores, and better adapted for castings than for converting into malleable iron. The pure, rich ores, however, are many of them unsurpassed. It is found in beds of all dimensions, and though in the eastern part of the United States they prove of limited extent, those of Missouri and Lake Superior are inexhaustible. Magnetic and specular ores are associated together in the same district, and sometimes are accompanied by hematite beds; and it is also the case, that iron districts are characterized by the prevalence of one kind only of these ores, to the exclusion of the others.

The red oxides of the secondary rocks consist, for the most part, of the red fossiliferous and oolitic ores that accompany the so-called Clinton group of calcareous shales, sandstones, and argillaceous limestones of the upper silurian along their lines of outcrop in Pennsylvania, Maryland, and eastern Tennessee, and from Oneida county, N. Y., westward past Niagara Falls, and through Canada even to Wisconsin. The ore is found in one or two bands, rarely more than one or two feet thick, and the sandstone strata with which they are associated are sometimes so ferruginous as to be themselves workable ores. The true ores are sometimes entirely made up of the forms of fossil marine shells, the original material of which has been gradually replaced by peroxide of iron. The oolitic variety is composed of fine globular particles, united together like the roe of a fish. The ore is also found in compact forms, and in Wisconsin it is in the condition of fine sand or seed. Its composition is very variable, and its per-centage of iron ranges from 40 to 60. By reason of the carbonate of lime diffused through some of the varieties, these work in the blast furnace very freely, and serve extremely well to mix with the silicious ores.

Of the varieties of carbonate of iron, the only ones of practical importance in the United States are the silicious and argillaceous carbonates of the coal formation, and the similar ores of purer character found among the tertiary clays on the western shores of Chesapeake Bay. The former varieties are the chief dependence of the iron furnaces of Great Britain, where they abundantly occur in layers among the shales of the coal formation, interstratified with the beds of coal—the shafts that are sunk for the exploration of one also penetrating beds

of the other. The layers of ore are in flattened blocks, balls, and kidney-shaped lumps, which are picked out from the shales as the beds of these are excavated. The ore is lean, affording from 30 to 40 per cent. of iron; but it is of easy reduction, and makes, when properly treated, iron of fair quality. In Pennsylvania, Ohio, western Virginia, Kentucky, and Tennessee, the ores occur with the same associations as in England; but the supply is, for the most part, very precarious, and many furnaces that have depended upon them are now kept in operation only by drawing a considerable portion of their supplies from the mines of Lake Superior, more than one thousand miles off. Among the horizontally stratified rocks west of the Alleghanies, the same bands of ore are traced over extensive districts, and are even recognized in several of the different states named. One of the most important of these bands is the buhrstone ore, so called from a cellular, flinty accompaniment which usually underlies it, the whole contained in a bed of peculiar fossiliferous limestone. So much carbonate of lime is sometimes present in the ore, that it requires no other flux in the blast furnace. Its percentage of iron is from 25 to 35. Along the line of outcrop of some of the carbonates are found deposits of hematite ores, the result of superficial changes in the former, due to atmospheric agencies long continued. In southern Ohio, at Hanging Rock particularly, numerous furnaces have been supported by these ores, and have furnished much of the best iron produced at the west.

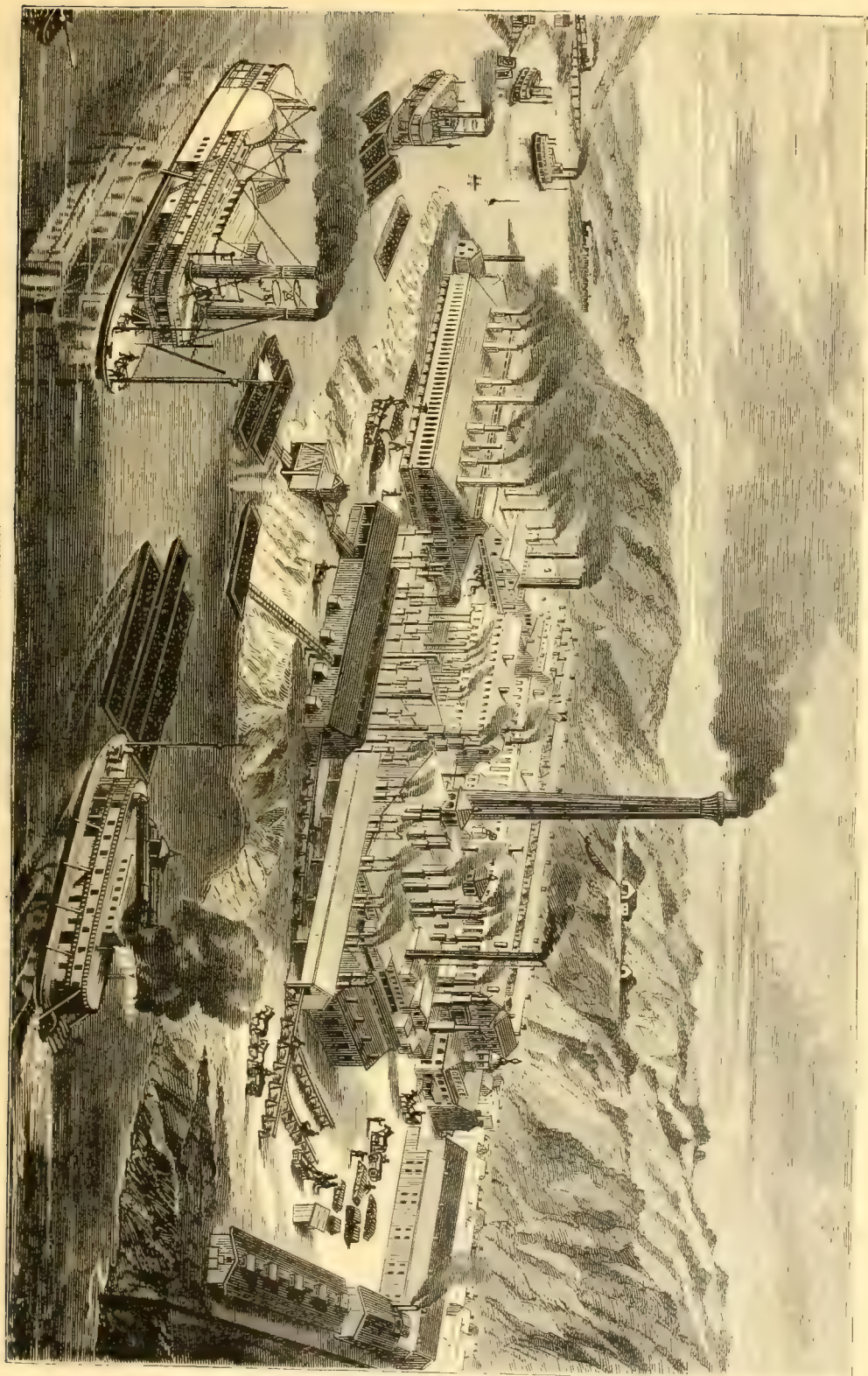
The carbonates of the tertiary are found in blocks and lumps among the clays along the shores of the Chesapeake at Baltimore, and its vicinity. The ores are of excellent character, work easily in the furnace, make a kind of iron highly esteemed—particularly for the manufacture of nails—and are so abundant that they have long sustained a considerable number of furnaces. They lie near the surface, and are collected by excavating the clay beds and sorting out the balls of ore. The excavations have been carried out in some places on the shore below the level of tide, the water being kept back by coffer dams and steam pumps.

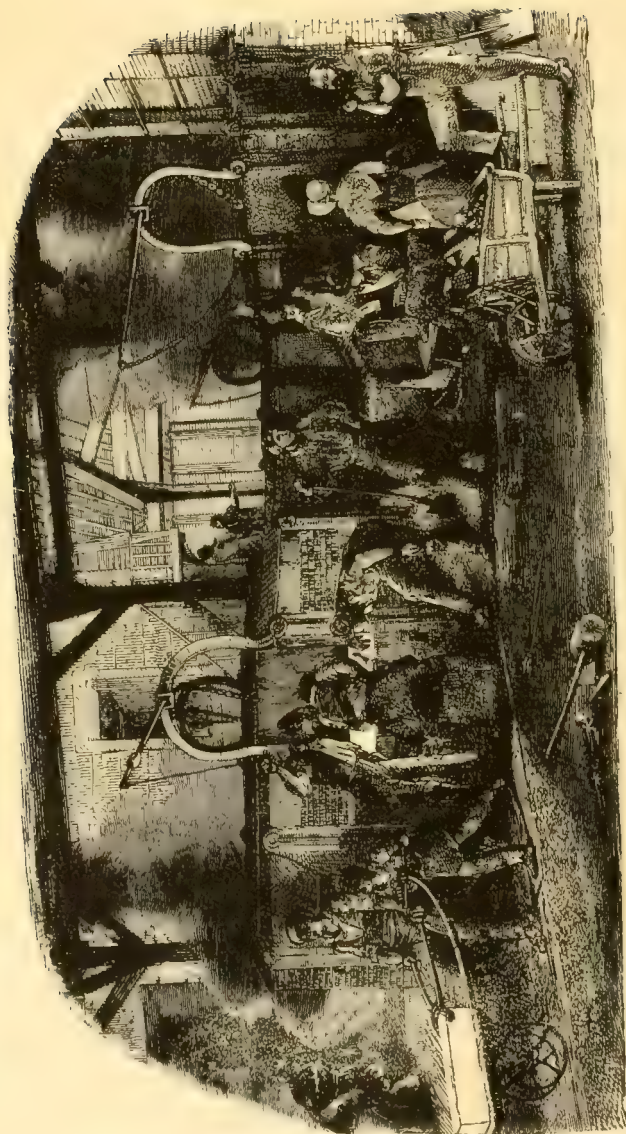
Bog ores, with which the earliest furnaces in the country were supplied, are now little used. They are rarely found in quantities sufficient for running the large furnaces of the present day, and, moreover, make but an

inferior, brittle quality of cast iron. They are chiefly found near the coast, and being easily dug, and also reduced to metal with great facility, they proved very convenient for temporary use before the great bodies of ore in the interior were reached. Some furnaces are still running on these ores in the south-west part of New Jersey, and at Snow-hill, on the eastern shore of Maryland, and the iron they make is used to advantage in mixing at the great stove foundries in Albany and Troy with other varieties of cast iron. It increases the fluidity of these, and produces with them a mixture that will flow into and take the forms of the minutest markings of the mould.

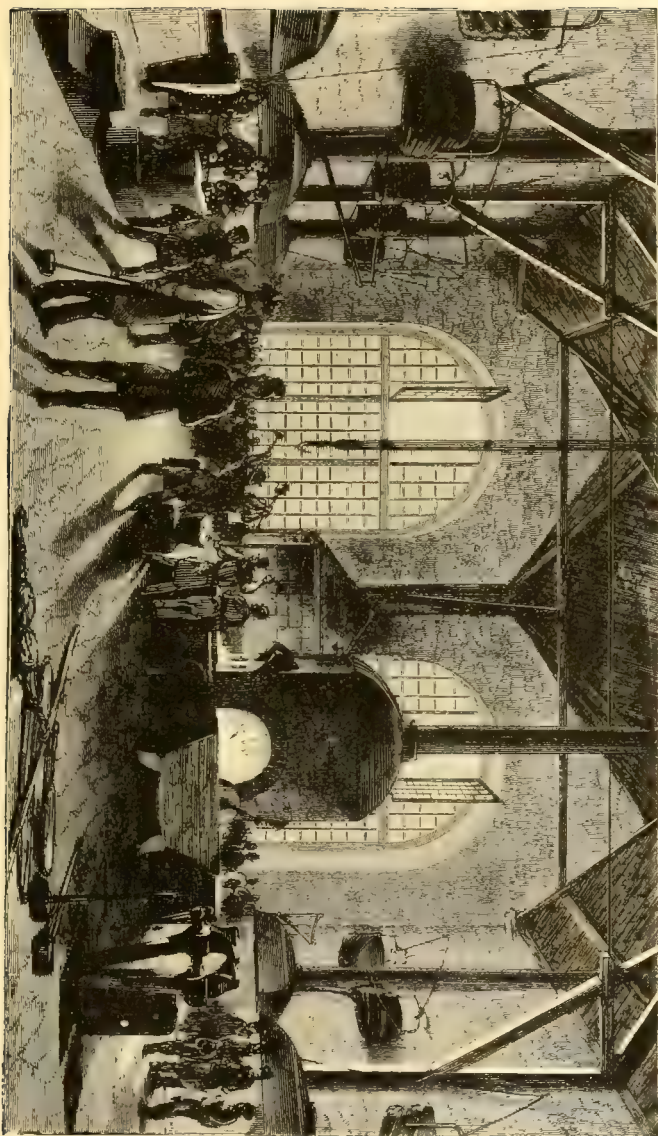
Charcoal has been the only fuel employed in the manufacture of iron until anthracite was applied to this purpose, about the year 1840, and still later—in the United States—coke and bituminous coal. So long as wood continued abundant in the iron districts, it was preferred to the mineral fuel, as in the early experience of the use of the latter the quality of the iron it produced was inferior to that made from the same ores with charcoal, and even at the present time, most of the highest-priced irons are made with charcoal. The hard woods make the best coal, and after these, the yellow pine. Hemlock and chestnut are largely used, because of their abundance and cheapness. The charcoal furnaces are of small size compared with those using the denser mineral coal, and their capacity rarely exceeds a production of ten or twelve tons of pig iron in twenty-four hours. In 1840 they seldom made more than four tons a day; the difference is owing to larger furnaces, the use of hot blast, and much more efficient blowing machinery. The consumption of charcoal to the ton of iron is one hundred bushels of hard-wood coal at a minimum, and from this running up to one hundred and fifty bushels or more, according to the quality of the coal and the skill of the manager. The economy of the business depends, in great part, upon the convenience of the supplies of fuel and of ores, of each of which rather more than two tons weight are consumed to every ton of pig iron. As the woods are cut off in the vicinity of the furnaces, the supplies are gradually drawn from greater distances, till at last they are sometimes hauled from ten to fourteen miles. The furnaces near Baltimore have been supplied with pine wood discharged from vessels at the coaling wharves.

AMERICAN IRON WORKS, PITTSBURGH, PA.

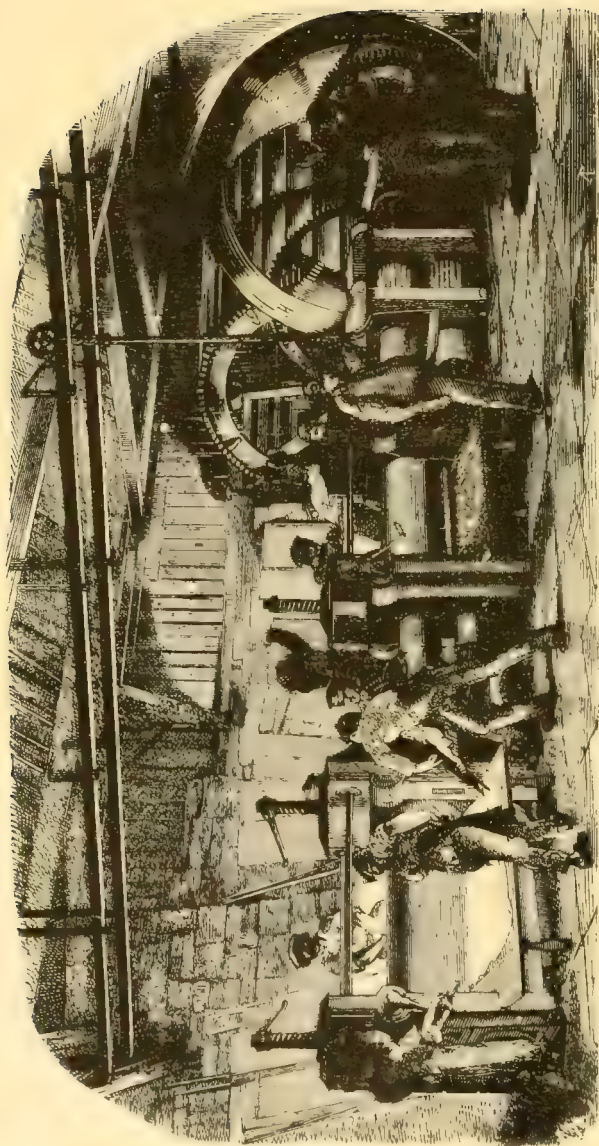




SMELTING PIG IRON.



FORGES AT CHALONS.



FLATTENING MACHINE.

close by the furnaces. Transportation of the fuel in such cases is a matter of secondary importance.

The mineral coals are a more certain dependence in this manufacture, and are cheaply conveyed from the mines on the great lines of transportation, so that furnaces may be placed anywhere upon these lines, with reference more especially to proximity of ores. Thus they can be grouped together in greater numbers than is practicable with charcoal furnaces. Their establishment, however, involves the outlay of much capital, for the anthracite furnaces are all built upon a large scale, with a capacity of producing from twenty to thirty tons of pig iron a day. This requires machinery of great power to furnish the immense quantities of air, amounting in the large stacks to fifteen tons or more every hour, and propel it through the dense column, of fifty to sixty feet in height, of heavy materials that fill the furnace. The air actually exceeds in weight all the other materials introduced into the furnace, and its efficiency in promoting combustion and generating intensity of heat is greatly increased by the concentration to which it is subjected when blown in under a pressure of six or eight pounds to the square inch. It is rendered still more efficient by being heated to temperature sufficient to melt lead before it is introduced into the furnace; and this demands the construction of heating ovens, through which the blast is forced from the blowing cylinders in a series of iron pipes, arranged so as to absorb as much as possible of the waste heat from the combustible gases that issue from the top of the stack, and are led through these ovens before they are finally allowed to escape. The weight of anthracite consumed is not far from double that of the iron made, and the ores usually exceed in weight the fuel. The flux is a small and cheap item, its weight ranging from one-eighth to one-third that of the ores.

The location of furnaces with reference to the market for the iron is a consideration of no small importance, for the advantages of cheap material may be overbalanced by the difference of a few dollars in the cost of placing in market a product of so little value to the ton weight as pig iron.

The following statement gave the cost of the different items which went to make up the total expense of production at the localities named in 1859. The advance in the

value of ores, cost of transportation, labor, and coal, have increased these items about 75 per cent. since 1863.

At different points on the Hudson river, anthracite furnaces are in operation, which are supplied with hematites from Columbia and Dutchess counties, N. Y., and from the neighboring counties in Massachusetts, at prices varying from \$2.25 to \$3.00 per ton; averaging about \$2.50. They also use magnetic ores from Lake Champlain, and some from the Highlands below West Point, the latter costing \$2.50, and the former \$3.50 to \$4.50 per ton; the average being about \$3.50. The quantities of these ores purchased for the ton of iron produced are about two tons of hematite and one of magnetic ore, making the cost for the ores \$6.75. Two tons of anthracite cost usually \$9, and the flux for fuel about 35 cents. Actual contract prices for labor and superintendence have been \$4 per ton. Thus the total expense for the ton of pig iron is about \$20.10; or, allowing for repairs and interest on capital, full \$21.

In the Lehigh valley, in Pennsylvania, are numerous furnaces, which are supplied with anthracite at the low rate of \$3 per ton, or \$6 to the ton of iron. The ores are mixed magnetic and hematites, averaging in the proportions used about \$3 per ton, or, at the rate consumed of $2\frac{1}{2}$ tons, \$7.50 to the ton of iron. Allowing the same amount—\$4.35—for other items, as at the Hudson river furnaces, the total cost is \$17.85; or, with interest and repairs, nearly \$19 per ton. The difference is in great part made up to the furnaces on the Hudson by their convenience to the great markets of New York, Troy, and Albany.

The charcoal iron made near Baltimore shows a higher cost of production than either of the above, and it is also subject to greater expenses of transportation to market, which is chiefly at the rolling mills and nail factories of Massachusetts. Its superior quality causes a demand for the product and sustains the business. For this iron per ton $2\frac{1}{2}$ tons of ore are consumed, costing \$3.62 $\frac{1}{2}$ per ton, or \$9.06; fuel, $3\frac{1}{2}$ cords at \$2.50, \$8.75; flux, oyster shells, 30 cts.; labor (including \$1.50 for charring) \$2.75; other expenses, \$2; total, \$22.86.

At many localities in the interior of Pennsylvania and Ohio, iron is made at less cost, but their advantages are often counterbalanced by additional expenses incurred in

delivering the metal, and obtaining the proceeds of its sale. Increased facilities of transportation, however, are rapidly removing these distinctions. At Danville, on the Susquehanna river, Columbia county, Pennsylvania, the cost of production has been reduced to an unusually low amount, by reason of large supplies of ore close at hand, the cheapness of anthracite, and the very large scale of the operations. Pig iron, as shown by the books of the company, has been made for \$11 per ton. Its quality, however, was inferior, so that, with the expenses of transportation added, it could not be placed in the eastern markets to compete with other irons. Pig iron is produced more cheaply on the Ohio river and some of its tributaries than elsewhere, but there are no furnaces in the United States which can make a good article much less than \$27 per ton.

DISTRIBUTION OF THE ORES.

The magnetic and specular ores of the United States are found in the belt of metamorphic rocks—the gneiss, quartz rock, mica and talcose slates, and limestones—which ranges along to the east of the Alleghanies, and spreads over the principal part of the New England states. It is only, however, in certain districts, that this belt is productive in iron ores. The hematites belong to the same group, and the important districts of the three ores may be noticed in the order in which they are met from Canada to Alabama. Similar ores are also abundant in Missouri, and to the south of Lake Superior.

NEW ENGLAND STATES.—In New Hampshire magnetic and specular ores are found in large quantities in a high granitic hill called the Baldface Mountain, in the town of Bartlett. The locality is not conveniently accessible, and its remoteness from coal mines will probably long keep the ore, rich and abundant as it is, of no practical value. At Piermont, on the western border of the state, specular ore, very rich and pure, is also abundant, but not worked. At Franconia a small furnace, erected in 1811, was run many years upon magnetic ores, obtained from a bed of moderate size, and which in 1824 had been worked to the depth of 200 feet. In 1830 the iron establishments of this place were still objects of considerable interest, though from the accounts of them published in the *American Journal of Science* of that year, it appears that the annual pro-

duction of the blast furnace for the preceding nine years had averaged only about "216 tons of cast iron in hollow ware, stoves, machinery, and pig iron"—a less quantity than is now produced in a week by some of the anthracite furnaces. One forge making bar iron direct from the ore produced forty tons annually, and another 100 tons, consuming 550 bushels of charcoal to the ton. The cost of this, fortunately, was only from \$3.75 to \$4.00 per hundred bushels. A portion of the product was transported to Boston, the freight alone costing \$25 per ton.

In Vermont these ores are found in the metamorphic slates of the Green Mountains, and are worked to some extent for mixing with the hematite ores, which are more abundant, being found in many of the towns through the central portion of the state, from Canada to Massachusetts. In 1850 the number of blast furnaces was ten, but their production probably did not reach 4,000 tons per annum, and has since dwindled away to a much less amount. At the same time there were seven furnaces in Berkshire, Mass., near the hematite beds that are found in the towns along the western line of the state. These had a working capacity of about 12,000 tons of pig iron annually, and this being made from excellent ores, with charcoal for fuel, its reputation was high and the prices remunerative; but as charcoal increased in price, and the cheaper anthracite-made iron improved in quality, the business became unprofitable; so that the extensive hematite beds are now chiefly valuable for furnishing ores to the furnaces upon the Hudson river, where anthracite is delivered from the boats that have come through the Delaware and Hudson canal, and magnetic ores are brought by similar cheap conveyance from the mines on the west side of Lake Champlain. Through Connecticut, down the Housatonic valley, very extensive beds of hematite have supplied the sixteen furnaces which were in operation ten years ago. The great Salisbury bed has already been named. In the first half of the present century it produced from 250,000 to 300,000 tons of the very best ore; the iron from which, when made with cold blast, readily brought from \$6 to \$10 per ton more than the ordinary kinds of pig iron. The Kent ore bed was of similar character, though not so extensive.

NEW YORK.—Across the New York state line, a number of other very extensive deposits of hematite supported seven blast fur-

naces in Columbia and Dutchess counties, and now furnish supplies to those along the Hudson river. In Putnam county, magnetic ores succeed the hematites, and are developed in considerable beds in Putnam Valley, east from Cold Spring, where they were worked for the supply of forges during the last century. These beds can again furnish large quantities of rich ore. On the other side of the river, very productive mines of magnetic ore have been worked near Fort Montgomery, six miles west from the river. At the Greenwood furnace, back from West Point, was produced the strongest cast iron ever tested, which, according to the report of the officers of the ordnance department, made to Congress in 1856, after being remelted several times to increase its density, exhibited a tenacity of 45,970 lbs. to the square inch. The beds at Monroe, near the New Jersey line, are of vast extent; but a small portion of the enormous quantities of ore in sight, however, makes the best iron. Mining was commenced here in 1750, and a furnace was built in 1751, but operations have never been carried on upon a scale commensurate with the abundance of the ores. In the northern counties of New York, near Lake Champlain, are numerous mines of rich magnetic ores. Some of the most extensive bloomery establishments in the United States are supported by them in Clinton county, and many smaller forges are scattered along the course of the Ausable river, where water power near some of the ore beds presents a favorable site. Bar iron is made at these establishments direct from the ores; and at Keeseville nail factories are in operation, converting a portion of the iron into nails. In Essex county there are also many very productive mines of the same kind of ore, and Port Henry and its vicinity has furnished large quantities, not only to the blast furnaces that were formerly in operation here, but to those on the Hudson, and to puddling furnaces in different parts of the country, particularly about Boston. In the interior of Essex county, forty miles back from the lake, are the extensive mines of the Adirondac. The ores are rich as well as inexhaustible, but the remoteness of the locality, and the difficulty attending the working of them, owing to their contamination with titanium, detract greatly from their importance. On the other side of the Adirondac mountains, in St. Lawrence county, near Lake Ontario, are found large beds of

specular ores, which have been worked to some extent in several blast furnaces. They occur along the line of junction of the granite and the Potsdam sandstone. The iron they make is inferior—suitable only for castings. The only other ores of any importance in the state are the fossiliferous ores of the Clinton group, which are worked near Oneida Lake, and at several points along a narrow belt of country near the south shore of Lake Ontario. They have sustained five blast furnaces in this region, and are transported in large quantities by canal to the anthracite furnaces at Scranton, in Pennsylvania, the boats returning with mineral coal for the furnaces near Oneida Lake.

NEW JERSEY.—From Orange county, in New York, the range of gneiss and hornblende rocks, which contain the magnetic and specular ores, passes into New Jersey, and spreads over a large part of Passaic and Morris, and the eastern parts of Sussex and Warren counties. The beds of magnetic ore are very large and numerous, and have been worked to great extent, especially about Ringwood, Dover, Rockaway, Boonton, and other towns, both in blast furnaces and in bloomeries. At Andover, in Sussex county, a great body of specular ores furnished for a number of years the chief supplies for the furnaces of the Trenton Iron Company, situated at Philipsburg, opposite the mouth of the Lehigh. On the range of this ore, a few miles to the north-east, are extensive deposits of Franklinite iron ore accompanying the zinc ore of this region. This unusual variety of ore consists of peroxide of iron about 66 per cent., oxide of zinc 17, and oxide of manganese 16. It is smelted at the works of the New Jersey Zinc Company at Newark, producing annually about 2,000 tons of pig iron. The metal is remarkable for its large crystalline faces and hardness, and is particularly adapted for the manufacture of steel, as well as for producing bar iron of great strength.

As the forests, which formerly supplied abundant fuel for the iron works of this region, disappeared before the increasing demands, attention was directed to the inexhaustible sources of anthracite up the Lehigh valley in Pennsylvania, with which this iron region was connected by the Morris canal and the Lehigh canal; and almost the first successful application of this fuel to the smelting of iron ores upon a large scale was made at Stanhope, by Mr. Edwin Post. A new

era in the iron manufacture was thus introduced, and an immense increase in the production soon followed, as the charcoal furnaces gave place to larger ones constructed for anthracite. The Lehigh valley, lying on the range of the iron ores toward the southwest, also produced large quantities of ore, which, however, was almost exclusively hematite. Hence, an interchange of ores has been largely carried on for furnishing the best mixtures to the furnaces of the two portions of this iron district; and the operations of the two must necessarily be considered together. The annual production, including that of the bloomeries of New Jersey, has reached, within a few years, about 140,000 tons of iron. But in a prosperous condition of the iron business this can be largely increased without greatly adding to the works already established, while the capacity of the iron mines and supplies of fuel are unlimited. The proximity of this district to the great cities, New York and Philadelphia, adds greatly to its importance.

PENNSYLVANIA.—Although about one-third of all the iron manufactured in the United States is the product of the mines of Pennsylvania, and of the ores carried into the state, the comparative importance of her mines has been greatly overrated, and their large development is rather owing to the abundant supplies of mineral coal conveniently at hand for working the ores, and, as remarked by Mr. Lesley ("Iron Manufacturer's Guide," p. 433), "to the energetic, persevering German use for a century of years of what ores do exist, than to any extraordinary wealth of iron of which she can boast. Her reputation for iron is certainly not derived from any actual pre-eminence of mineral over her sister states. New York, New Jersey, Virginia, and North Carolina, are far more liberally endowed by nature in this respect than she. The immense magnetic deposits of New York and New Jersey almost disappear just after entering her limits. The brown hematite beds of her great valley will not seem extraordinary to one who has become familiar with those of New York, Massachusetts, Vermont, Virginia, and Tennessee. Her fossil ores are lean and uncertain compared with those of the south; and the carbonate and hematized carbonate outcrops in and under her coal measures will hardly bear comparison with those of the grander outspread of the same formations in Ohio, Kentucky, and western Vir-

ginia." The principal sources of iron in the state are, first, the hematites of Lehigh and Berks counties—the range continuing productive through Lancaster, also on the other side of the intervening district of the new red sandstone formation. The ores are found in large beds in the limestone valley, between the South and the Kittatinny mountains; those nearest the Lehigh supply the furnaces on that river, already amounting to twenty-three in operation and four more in course of construction, and those nearer the Schuylkill supply the furnaces along this river. The largest bed is the Moselem, in Berks county, six miles west-south-west from Kutztown. It has been very extensively worked, partly in open excavation and partly by underground mining, the workings reaching to the depth of 165 feet. Over 20,000 tons a year of ore have been produced, at a cost of from \$1.30 to \$1.50 per ton.

Magnetic ores are found upon the Lehigh, or South mountain, the margin on the south of the fertile limestone valley which contains the hematite beds. These, however, are quite unimportant, the dependence of the great iron furnaces of the Lehigh for these ores being on the more extensive mines of New Jersey; while the only supplies of magnetic ores to the furnaces of the Schuylkill and the Susquehanna are from the great Cornwall mines, four miles south of Lebanon. An immense body of magnetic iron ore, associated with copper ores, has been worked for a long time at this place, at the junction of the lower silurian limestones and the red sandstone formation. The bed lies between dikes of trap, and exhibits peculiarities that distinguish it from the other bodies of iron ore on this range. The Warwick, or Jones' mine, in the south corner of Berks county, resembles it in some particulars. Its geological position is in the upper slaty layers of the Potsdam sandstone, near the meeting of this formation with the new red sandstone. Trap dikes penetrate the ore and the slates, and the best ore is found at both mines near the trap. Not far from York, Pa., an ore known as the Codorus Iron Ore has been raised for some years, but was regarded as almost worthless, but recent experiments have led to the discovery that it contains the exact ingredients necessary to make it the best of fluxes for reducing the other ores of that region to steel of excellent quality without any intermediate process. Along the Maryland line, on both sides of the

Susquehanna, chrome iron has been found in considerable abundance in the serpentine rocks, and has been largely and very profitably mined for home consumption and for exportation. It furnishes the different chrome pigments, and their preparation has been carried on chiefly at Baltimore.

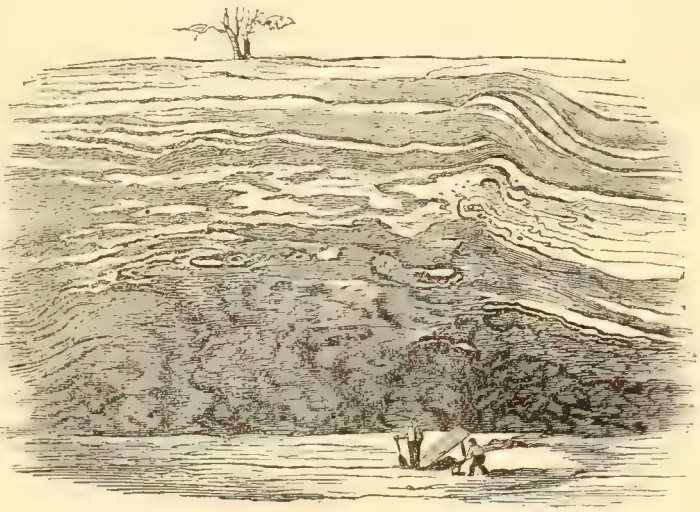
A portion of the hematites which supply the furnaces on the Schuylkill, occur along a narrow limestone belt of about a mile in width, that crosses the Schuylkill at Spring Mill, and extends north-east into Montgomery county, and south-west into Chester county. Their production has been very large, and that of the furnaces of the Schuylkill valley dependent upon these and the other mines of this region has been rated at 100,000 tons of iron annually.

The great Chestnut hill hematite ore bed, three and a half miles north-east of Columbia, Lancaster county, covers about twelve acres of surface, and has been worked in numerous great open excavations to about 100 feet in depth, the ore prevailing throughout among the clays and sands from top to bottom. "The floor of the mine is hard, white Potsdam sandstone, or the gray slaty layers over it. The walls show horizontal wavy layers of blue, yellow, and white laminated, unctuous clays, from forty to sixty feet deep, containing ore, and under these an irregular layer of hard concretionary, cellular, fibrous, brown hematite from ten to thirty feet thick down to the sandstone." ("Iron Manufacturer's Guide, p. 562.") In the accompanying wood-cut, the darkly shaded portions represent the hematites, while the lighter portions above are chiefly clays. Professor Rogers supposes that the ore has leached down from the upper slaty beds through which it was originally diffused, and has collected upon the impervious sandstone, which in this vicinity is the first water bearing stratum for the wells.

The repeated occurrence of the lower

silurian limestones and sandstones along the valleys of central Pennsylvania, from the Susquehanna to the base of the Alleghany mountain, is accompanied through these valleys with numerous beds of hematite; and to the supplies of ore they have furnished for great numbers of furnaces, is added the fossiliferous ore of the Clinton group, the outcrop of which is along the slopes of the ridges and around their ends. Many furnaces have depended upon this source of supply alone. As stated by Lesley, there were, in 1857, 14 anthracite furnaces that used no other, and 11 anthracite furnaces which mixed it either with magnetic ore or hematite, or with both. Montour's ridge, at Danville, Columbia county, referred to on page 24, is one of the most remarkable localities of this ore. Professor Rogers estimated, in 1847, that there were 20 furnaces then dependent upon the mines of this place, and producing annually an average of 3,000 tons of iron each, with a consumption of 9,000 tons of ore, or a total annual consumption of 180,000 tons. At this rate, he calculated that the available ore would be exhausted in 20 years.

Between the Clinton group and the coal measures are successive formations of limestones, sandstones, shales, etc., which form a portion of the geological column of many thousand feet in thickness; and among these strata, ores like the carbonates of the coal measures



CHESTNUT HILL MINE.

are occasionally developed, and these are recognized and worked at many localities along the outcrop of the formations to

which they belong. Though of some local importance, they do not add very largely to the iron production of the state. Along the summit of the Alleghany mountain the base of the coal measures is reached, which thence spread over the western portion of the state, nearly to its northern line. The ores which belong to this formation are chiefly contained among its lower members, and found in the outcrop of these around the margin of the basin. At some localities they have been obtained in considerable abundance, and many furnaces have run upon them alone; but for large establishments of several furnaces together, they prove a very uncertain dependence.

MARYLAND.—The metamorphic belt crosses this state back of Baltimore, and is productive in chromic iron and copper ores, rather than in magnetic and specular ores. Some of the former, highly titaniferous, have been worked near the northern line of the state, on the west side of the Susquehanna; and at Sykesville, on the Potomac, a furnace has been supplied with specular ores from its vicinity. Several hematite beds within twenty miles of Baltimore have supplied considerable quantities of ore for mixture with the tertiary carbonates, upon which the iron production of the state chiefly depends. Beds of these occur near the bay from Havre de Grace to the District of Columbia. In the western part of the state large furnaces were built at Mount Savage and Lonaconing to work the ores of the coal formation; but the supply has proved insufficient to sustain them. In 1853 the capacity of the blast furnaces of the state was equal to a production of over 70,000 tons of iron. This, however, has never been realized.

SOUTHERN STATES.—South of Maryland the same iron belt continues through Virginia, the Carolinas, and Georgia; and although it is often as productive in immense beds of the three varieties of ore—the magnetic, specular, and hematite—as in the other states along its range, these resources add comparatively little to the material wealth of the states to which they belong. Through Virginia, east and west of the Blue Ridge, hematite ores abound in the limestone valleys, and magnetic ores are often in convenient proximity to them. Many small furnaces have worked them at different times, but their product was always small. Three belts of magnetic ore, associated with

specular iron and hematites, are traced across the midland counties of North Carolina, and have furnished supplies for furnaces and forges in a number of counties—as Lincoln, Cleveland, Rutherford, Stokes, Surry, Yadkin, Catawba; and Chatham, Wake, and Orange counties upon the eastern belt. The belt of ore from Lincoln county passes into South Carolina, and through York, Union, and Spartanburg districts. It crosses the Broad River at the Cherokee ford, and though the whole belt is only half a mile wide, it presents numerous localities of the three kinds of ore, and of limestone also in close proximity, and finely situated for working. Several other localities are noticed in the "State Geological Report," by M. Tuomey, who remarks, on page 278, that "if iron is not manufactured in the state as successfully as elsewhere, it is certainly not due to any deficiency in natural advantages." In northern Georgia the ferruginous belt is productive in immense bodies of hematite, associated with magnetic and specular ores, in the Allatoona hills, near the Etowah river, in Cherokee and Cass counties. This, which appears to be one of the great iron districts of the United States, though bountifully provided with all the materials required in the manufacture, and traversed by a railroad which connects it with the bituminous coal mines of eastern Tennessee, supports only six small charcoal furnaces of average capacity, not exceeding 600 or 700 tons per annum each. In Alabama, hematites and specular ores accompany the belt of silurian rocks to its southern termination, and are worked in a few bloomy fires and two or three blast furnaces. The fossiliferous ore of the Clinton group is also worked in this state.

TENNESSEE in 1840 ranked as the third iron-producing state in the Union. The counties ranging along her eastern border produced hematite ores, continuing the range of the silurian belt of the great valley of Virginia; those bordering the Clinch river produced the fossil ore of the Clinton group, there known as the dyestone ore; and western Tennessee presented a very interesting and important district of hematites belonging to the subcarboniferous limestone in the region lying east of the Tennessee and south of the Cumberland river.* The

* "It is remarkable that most of these deposits



furnaces of this district, which have numbered 42 in all, were the greater part of them in Dickson, Montgomery, and Stewart counties. They were all supplied with charcoal for fuel, at a cost of \$4 per hundred bushels. In 1854 the product of pig iron was 37,918 tons; but it gradually declined to 27,050 tons in 1857; and in August, 1858, only 15 furnaces were in operation. The close of the war gave a new impulse to the production of iron in Tennessee, and with her excellent ores and her extensive forests she is already taking the lead among the southwestern States in the production of a charcoal iron of superior quality, and will soon produce, also, large quantities of coke or bituminous coal iron.

KENTUCKY.—The western part of this state contains, in the counties of Calloway, Trigg, Lyon, Caldwell, Livingston, and Crittenden, an important district of hematite ores—the continuation northward of that of Tennessee. In 1857 10 charcoal furnaces produced 15,600 tons of iron. Eastern Kentucky, however, has a much more productive district in the counties of Carter and Greenup, which is an extension south of the Ohio of the Hanging Rock iron district of Ohio. The ores are carbonates and hematite outcrops of carbonates, belonging to the coal measures and the subcarboniferous limestone. They are in great abundance; a section of 740 feet of strata terminating below with the limestone named, presenting no less than 14 distinct beds of ore, from three inches to four feet each, and yielding from 25 to 60 per cent. of iron. One bed of 32 per cent. iron contains also 11 per cent. bitumen—a composition like that of the Scotch “black band” ore. Others contain so much lime, that the ores are valuable for fluxing as well as for producing iron. The furnaces use charcoal

and coke. Their production, taken with that of the same district in Ohio, places this region, as will be seen in the tables to follow, among the first in importance in the United States.

OHIO.—The ores of this state, like those of Kentucky, belong almost exclusively to the coal measures and the limestone formations beneath. In both states some of the fossiliferous ore also is found, but it is comparatively unimportant. The productive beds are near the base of the coal formation, ranging from the Hanging Rock district of Scioto and Lawrence counties north-east through Jackson, Hocking, Athens, Perry, Muskingum, Tuscarawas, Mahoning, and Trumbull counties, to the line of Mercer county in Pennsylvania. The uncertain character of the ores, both as to supply and quality, is strikingly shown by the fact that many of the furnaces of the more northern counties depend for a considerable portion—one-fourth or more—of the ores they use upon the rich varieties from Lake Superior and Lake Champlain. Although the long transportation makes these ores cost nearly three times as much per ton as those of the coal formation, some furnaces find it more profitable to use the former, even in the proportion of three-fourths, on account of the much better iron produced, the greater number of tons per day, and the less consumption of fuel to the ton. The fuel employed is charcoal in many of the furnaces; some have introduced raw bituminous coal to good advantage.

INDIANA, ILLINOIS, and IOWA contain no important bodies of iron ore. The coal measures, which cover large portions of these states, are productive in some small quantities of the carbonates, in the two former, which give support to a very few furnaces; but in Iowa they contain no workable beds at all.

MICHIGAN.—The iron region of this state is in the upper peninsula, between Green Bay and Lake Superior. Magnetic and specular ores are found throughout a large portion of this wild territory, in beds more extensive than are seen in any other part of the United States—perhaps than are anywhere known. The district approaches within twelve miles of the coast of Lake Superior, from which it is more conveniently reached than from the south side of the peninsula. The ores are found in a belt of crystalline slates, of six to ten miles in

are of what is called pot ore, that is, hollow balls of ore, which, when broken open, look like broken caldrons. One of them, preserved by Mr. Lewis, is 8 feet across the rim! Another is six feet across. The majority are crossed within by purple diaphragms or partitions of ore, and the interstitial spaces are filled with yellow ochre. Some, like the great eight-foot pot, are found to be full of water. The inside surface is mammillary, irregular, sometimes botryoidal or knobby, but the outside is pretty smooth and regular. All these pots were undoubtedly once balls of carbonates of lime and iron segregated in the original deposit. . . . Gypsum and pyrites are both often found in these Tennessee pots.”—*Iron Manufacturer's Guide*, p. 603.

width, that extends west from the lake shore, and is bounded north and south by a granitic district. They are developed in connection with great dikes and ridges of trap, which range east and west, and dip with the slates at a high angle toward the north. The ores also have the same direction and dip. Localities of them are of frequent occurrence for eighteen miles in a westerly direction from the point of their nearest approach to Lake Superior. A second range of the beds is found along the southern margin of the slate district; and about thirty miles back from the lake, where the slates extend south into Wisconsin, similar developments of ore accompany them to the Menomonee river and toward Green Bay. The quality of the ore found at different places varies according to the amount of quartz, jasper, hornblende, or feldspar that may be mixed with it; but enormous bodies are nearly pure ore, yielding from 68 to 70 per cent. of iron, and free from a trace even of manganese, sulphur, phosphorus, or titanium. A single ridge, traced for about six miles, rising to a maximum height of fifty feet above its base, and spreading out to a width of one thousand feet, has been found to consist of great longitudinal bands of ore, much of which is of this perfectly pure character. Another ridge presents precipitous walls fifty feet high, composed in part of pure specular ore, fine grained, of imperfect slaty structure, and interspersed with minute crystals of magnetic oxide; and in part of these minute crystals alone. Another body of one thousand feet in width, and more than a mile long, forms a hill one hundred and eighty feet high, which is made up of alternate bands of pure, fine grained, steel-gray peroxide of iron, and deep red jaspery ore—the layers generally less than a fourth of an inch in thickness, and curiously contorted. Their appearance is very beautiful in the almost vertical walls. On one of the head branches of the Escanaba is a cascade of thirty-seven feet in height, the ledge over which the water falls being a bed of peroxide of iron, intermixed with silicious matter.

For the supply of the few furnaces and bloomery establishments already in operation in this district, and for the larger demands of distant localities, the ores are collected from open quarries, and from the loose masses lying around. A railroad affords the means of transporting them to Marquette, on the lake shore, whence they are shipped by

vessels down the lake. The business already amounts to more than 100,000 tons per annum, and is increasing very rapidly. The name Bay de Noquet and Marquette railroad suggests a southern terminus of this road on Green Bay, and when an outlet is opened in this direction, the production of iron ores will no doubt exceed that of any other region upon the globe. Large quantities will be reduced with charcoal in blast furnaces and bloomeries in the region itself; and when the forests in the vicinity of the works are cut off, the extensive timbered lands around Lake Michigan and Lake Huron will furnish inexhaustible supplies of fuel, which may be brought in vessels to the furnaces, as the pine wood from the forests around Chesapeake Bay has long been delivered to the furnaces on its western shore. Anthracite and bituminous coal will also be brought back as return cargoes by the vessels that carry the ores to the coal fields of Ohio and Pennsylvania. With its vast inland navigation and wonderful resources of iron and of copper also, the north-western portion of our country promises to be the scene of a more extended and active industry than has ever grown out of the mines of any part of the world.

WISCONSIN.—Magnetic and specular ores in bodies, somewhat resembling those of the region just described, are found in the extreme northern part of Wisconsin, upon what is known as the Penokie range, distant about 25 miles from Chegwomigon Bay, Lake Superior. Bad River and Montreal River drain this district. The ores, from their remoteness, are not soon likely to be of practical importance. Other immense bodies of these ores, estimated to contain many millions of tons, are found on Black River, which empties into the Mississippi below St. Croix river, on the line of the Land Grant Branch railroad. A furnace has been built by a German company to work these mines. In the eastern part of Wisconsin the oolitic ore of the Clinton group is met with in Dodge and Washington counties, and again at Depere, seven miles south-east of Green Bay. In the town of Hubbard, Dodge county, forty miles west from Lake Michigan, is the largest deposit of this ore ever discovered. It spreads in a layer ten feet thick over 500 acres, and is estimated to contain 27,000,000 tons. It is in grains, like sand, of glistening red color, staining the hands. Each grain has a minute nucleus of silice, around which the

oxide of iron collected. The per-centage of metal is about fifty. This ore will probably be worked near Milwaukee with Lake Superior ores, the La Crosse railroad, which passes by the locality, already affording the means of cheap transportation.

MISSOURI.—This state must be classed among the first in the abundance of its iron ores, though up to this time comparatively little has been done in the development of its mines. The ores are exclusively hematites, and the magnetic and specular, and all occur in the isolated district of silurian rocks—formations which almost everywhere else in the western middle states are concealed beneath the more recent formations. In the counties along the line of the Pacific railroad south-west branch, Prof. Swallow, the state geologist, reports no less than ninety localities of hematite. These are in Jefferson, Franklin, Crawford, Phelps, Pulaski, Marion, Green, and other counties. The first attempts to melt iron in Missouri, and probably in any state west of Ohio, were made in Washington county, in 1823 or 1824, and with the hematites of the locality were mixed magnetic ores from the Iron mountain. In Franklin county there is but one furnace, though on both sides of the Maramec are beds of hematite pipe ore, which cover hundreds of acres. The Iron mountain district is about sixty miles back from the Mississippi river (the nearest point on which is St. Genevieve), and extends from the Iron mountain in the south-east part of Washington county into Madison county. It includes three important localities of specular ore: the Iron Mountain, Pilot Knob, and Shepherd mountain. The first is a hill of gentle slopes, 228 feet high above its base, and covering about 500 acres—a spur of the porphyritic and syenitic range on the east side of Bellevue valley. In its original state, as seen by the writer in 1841, it presented no appearance of rock in place, its surface was covered with a forest of oak, the trees thriving in a soil wholly composed of fragments of peroxide of iron, comminuted and coarse mixed together. Loose lumps of the ore were scattered around on every side but the north, and upon the top were loose blocks of many tons weight each. Mining operations, commenced in 1845, developed only loose ore closely packed with a little red clay. An Artesian well was afterward sunk to the depth of 152 feet. It passed through the following strata in succession:

iron ore and clay, 16 feet; sandstone, 34 feet; magnesian limestone, $7\frac{1}{2}$ inches; gray sandstone, $7\frac{1}{2}$ inches; "hard blue rock," 37 feet; "pure iron ore," 5 feet; porphyritic rock, 7 feet; iron ore 50 feet to the bottom. The ore appears to be interstratified with the silicious rocks with which it is associated in a similar manner to its occurrence at the other localities, and data are yet wanting to determine how much may exist in the hill itself, as well as below it. Enough is seen to justify any operations, however extensive, that depend merely upon continued supplies of ore. In quality the ore is a very pure peroxide; it melts easily in the furnace, making a strong forge pig, well adapted for bar iron and steel. Two charcoal furnaces have been in operation for a number of years, and up to the close of 1854 had produced 24,600 tons of iron. The flux is obtained from the magnesian limestone, which spreads over the adjoining valley in horizontal strata.

Pilot Knob is a conical hill of 580 feet height above its base, situated six miles south of the Iron mountain. Its sides are steep, and present bold ledges of hard, slaty, silicious rock, which lie inclined at an angle of 25° to 30° toward the south-west. Near the top the strata are more or less charged with the red peroxide of iron, and loose blocks of great size are seen scattered around, some of them pure ore, and some ore and rock mixed. At the height of 440 feet above the base, where the horizontal section of the mountain is equal to an area of fifty-three acres, a bed of ore is exposed to view on the north side, which extends 273 feet along its line of outcrop, and is from nineteen to twenty-four feet in thickness. It is included in the slaty rocks, and dips with them. Other similar beds are said to occur lower down the hill; and higher up others are met with to the very summit. The peak of the mountain is a craggy knob of gray rocks of ore, rising sixty feet in height, and forming so conspicuous an object as to have suggested the name by which the hill is called. The ore is generally of more slaty structure than that of the Iron mountain, and some of it has a micaceous appearance. The quantity of very pure ore conveniently at hand is inexhaustible. The production of iron will be limited more for want of abundance of fuel than of ore. Charcoal, however, may be obtained in abundance for many years to come, and bituminous coal may also be

brought from the coal mines of Missouri and Illinois, as the ores also can be carried to the river to meet there the fuel. The locality is already connected with St. Louis by a railroad. A blast furnace was built here in 1846, and another in 1855. A bloomery with six fires was started in 1850, and has produced blooms at an estimated cost of \$30 per ton.

Shepherd mountain, about a mile distant from the Pilot Knob toward the south-west, is composed of porphyritic rocks, which are penetrated with veins or dikes of both magnetic and specular ores. These run in various directions, and the ores they afford are of great purity. They are mined to work together with those of the Pilot Knob. The mountain covers about 800 acres, and rises to the height of 660 feet above its base. Other localities of these ores are also known, and the occurrence of specular ore is reported by the state geologists in several other counties, as Phelps, Crawford, Pulaski, La Clede, etc.

In many parts of the United States and its territories iron is known to exist in great quantities. In Nebraska and Wyoming territory, near the line of the Union Pacific Railroad, large beds of iron ore of good quality are found, in proximity to extensive coal deposits, and these will be utilized for making rails of iron or steel for that great thoroughfare. In Kansas, Colorado, and New Mexico, are beds of specular and other ores in great profusion. The northern territories, as well as the Pacific States and territories, have abundant ores of the richest qualities, and coal enough and wood enough to melt them successfully.

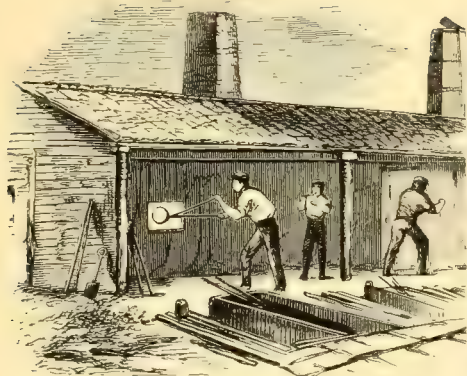
IRON MANUFACTURE.

Iron is known in the arts chiefly in three forms—cast iron, steel, and wrought iron. The first is a combination of metallic iron, with from $1\frac{1}{2}$ to 5 or $5\frac{1}{2}$ per cent. of carbon; the second is metallic iron combined with $\frac{1}{2}$ to $1\frac{1}{2}$ per cent. of carbon; and the third is metallic iron, free as may be from foreign substances. These differences of composition are accompanied with remarkable differences in the qualities of the metal, by which its usefulness is greatly multiplied. The three sorts are producible as desired directly from the ores, and they are also convertible one into the other; so that the methods of manufacture are numerous, and new processes are continually introduced. The production

of wrought iron direct from the rich natural oxides, was until modern times the only method of obtaining the metal. Cast iron was unknown until the 15th century. Rude nations early learned the simple method of separating the oxygen from the ores by heating them in the midst of burning charcoal; the effect of which is to cause the oxygen to unite with the carbon in the form of carbonic acid or carbonic oxide gas, and escape, leaving the iron free, and in a condition to be hammered at once into bars. The heat they could command in their small fires was insufficient to effect the combination of the iron, too, with the carbon, and produce the fusible compound known as cast iron. In modern times the great branch of the business is the production of pig metal or cast iron in blast furnaces; and this is afterward remelted and cast in moulds into the forms required, or it is converted into wrought iron to serve some of the innumerable uses of this kind of iron, or to be changed again into steel. In this order the principal branches of the manufacture will be noticed.

The production of pig metal in blast furnaces is the most economical mode of separating iron from its ores, especially if these are not extremely rich. The process requiring little labor, except in charging the furnaces, and this being done in great part by labor-saving machines, it can be carried on upon an immense scale with the employment of few persons, and most of those ordinary laborers. The business, moreover, has been greatly simplified and its scale enlarged by the substitution of mineral coal for charcoal—the latter fuel, indeed, could never have been supplied to meet the modern demands of the manufacture.

Blast furnaces are heavy structures of stone work, usually in pyramidal form, built upon a base of 30 to 45 feet square, and from 30 to 60 feet in height. The outer walls, constructed with immense solidity and firmly bound together, inclose a central cavity, which extends from top to bottom and is lined with large fire brick of the most refractory character, and specially adapted in their shapes to the required contour of the interior. The form of this cavity is circular in its horizontal section, and from the top goes on enlarging to the lower portion, where it begins to draw in by the walls changing their slope toward the centre. This forms what are called the boshes of the furnace—the part which supports the great weight of the ores



PUDDLING



CASTING PIG IRON.



BLAST FURNACE.



CASTING STEEL INGOTS.

and fuel that fill the interior. For ores that melt easily and fast they are made steeper than for those which are slowly reduced. The boshes open below into the hearth—the central contracted space which the French name the crucible of the furnace. The walls of this are constructed of the most refractory stones of large size, carefully selected for their power to resist the action of fire, and seasoned by exposure for a year or more after being taken from the quarry. Being the first portion to give out, the stack is built so that they can be replaced when necessary. The hearth is reached on each side of the stack by an arch, extending in from the outside. On three sides the blast is introduced by iron pipes that pass through the hearth-stones, and terminate in a hollow tuyere, which is kept from melting by a current of water brought by a lead or block-tin pipe, and made to flow continually through and around its hollow shell. The fourth side is the front or working-arch of the furnace, at the bottom of which access is had to the melted materials as they collect in the receptacle provided for them at the base of the hearth or crucible. This arch opens out into the casting-house, upon the floor of which are the beds in the sand for moulding the pigs into which the iron is to be cast. Upon the top of the stack around the central cavity are constructed, in first-class furnaces, large flues, which open into this cavity for the purpose of taking off a portion of the heated gaseous mixtures, that they may be conveyed under the boilers, to be there more effectually consumed, and furnish the heat for raising steam for the engines. A portion of the gases is also led into a large heating-oven, usually built on the top of the stack, in which the blast (distributed through a series of cast iron pipes) is heated by the combustion. These pipes are then concentrated into one main, which passes down the stack and delivers the heated air to the tuyeres, thus returning to the furnace a large portion of the heat which would otherwise escape at the top, and adding powerfully to the efficiency of the blast by its high temperature. The boilers, also conveniently arranged on the top of the furnace, especially when two furnaces are constructed near together, are heated by the escape gases without extra expense of fuel, and they furnish steam to the engines, which are usually placed below them. On account of the enormous volume of air, and the great pressure at which it is blown into the

furnace, the engines are of the most powerful kind, and the blowing cylinders are of great dimensions and strength. Some of the large anthracite furnaces employ cylinders $7\frac{1}{2}$ feet diameter, and 9 feet stroke. One of these running at the rate of 9 revolutions per minute, and its piston acting in both directions, should propel every minute 7,128 cubic feet of air (less the loss by leakage) into the furnace—a much greater weight than that of all the other materials introduced. It is, moreover, driven in at a pressure (produced by the contracted aperture of the nozzle of the tuyeres in relation to the great volume of air) of 7 or 8 lbs. upon the square inch. Two such cylinders answer for a pair of the largest furnaces, and should be driven by separate engines, so that in case of accident the available power may be extended to either or both furnaces. It is apparent that the engines, too, should be of the largest class and most perfect construction; for the blast is designed to be continued with only temporary interruptions that rarely exceed an hour at a time, so long as the hearth may remain in running order—a period, it may be, of 18 months, or even 4 or 5 years. Furnaces were formerly built against a high bank, upon the top of which the stock of ore and coal was accumulated, and thence carried across a bridge, to be delivered into the tunnel-head or mouth of the furnace. The more common arrangement at present is to construct, a little to one side, an elevator, provided with two platforms of sufficient size to receive several barrows. The moving power is the weight of a body of water let into a reservoir under the platform when it is at the top. This being allowed to descend with the empty barrows, draws up the other platform with its load, and the water is discharged by a self-regulating valve at the bottom. The supply of water is furnished to a tank in the top either by pumps connected with the steam engine or by the head of its source.

The furnaces of the United States, though not congregated together in such large numbers as at some of the great establishments in England and Scotland, are unsurpassed in the perfection of their construction, apparatus, and capacity; and none of large size are probably worked in any part of Europe with such economy of materials. The Siemen's regenerating furnace is adopted in those more recently built, wherever an intense heat is required for the reduction of the ores.

WROUGHT IRON.

It has been, in the past, a just ground of complaint against the producers of wrought iron and steel, that they could not reduce either directly from the ore—but must go through the long and tedious processes of first making pig or cast iron, then eliminating the carbon from the cast iron by a still more tedious process to produce the wrought iron, and then restore a part of the carbon to make steel. It was said with truth that the half-civilized Hindoo tribes and even the barbarous Fans of West Africa, made their native wrought iron (the *wootz* of India) directly from the ore of an excellent quality, and by a much simpler process than was adopted either in Europe or the United States.

There has been, until within the past fifteen or eighteen years, a spirit strongly adverse to progress or improvement among iron producers. By their rude and wasteful processes and their adherence to traditional methods and tests, they succeeded in making a fair though not very uniform quality of wrought iron, at a pretty high cost, but they deprecated any change even if it were for the better. The philosophy and chemistry of iron-making were not well understood, and the time and way of its “coming to nature” a term which conveys the idea of a mystery, was a secret which could only be learned, it was thought, by some supernatural inspiration or some extraordinary skill, only to be acquired by long experience and careful observation.

The Bessemer process, invented and put in practice about 1852, first disturbed this popular idea; but in its earlier history this process was not entirely free from guess-work and the coming-to-nature theory by some sudden and unexplicable change; subsequent discoveries and experiments removed this mystery entirely, and there is not, to-day, in practical chemistry and metallurgy a more thoroughly-defined science than that of making iron. The iron master, who is fully educated for his business, having before him an accurate analysis of his ores, and knowing, as he can if he will, that they are constant in their composition, proceeds with the utmost certainty to add other ores, or to permeate the molten ore with atmospheric air, or to force additional oxygen through it by means of nitrate of soda, nitrate of potassa, peroxide of iron, or other oxygen-yielding compound, or introduces a definite quantity of man-

ganese, powdered charcoal, or spiegeleisen, or in some cases silica, to act as flux and remove the sulphur, phosphorus, or other impurity, and to destroy the excess of carbon. He knows, too, just what heat is requisite, and how long it must be continued to produce a certain result every time. Here is no guess-work, no “rule of thumb,” no uncertainty. If he requires the best steel for rails, he can furnish it of precisely standard quality every time; if he is producing steel for the finest cutlery he can produce that; if he desires a wrought iron which shall be so tough and flexible that it can be bent double cold without any symptoms of flaw or crack, he knows just what percentage of the different ores, what eliminating processes, and what amount and duration of heat is necessary to produce it.

Now, as in the past, there are different grades and qualities of cast iron, wrought iron, and steel, intended for different purposes, made from different ores, and possessing different degrees of tenacity, hardness, and ductility; but the iron-maker who cannot produce from a given ore, or ores, that description of iron which he desires, without failure, does not understand his business.

Cast iron contains, according to the purpose for which it is intended, from five to six and a half per cent of pure carbon, either chemically or mechanically combined, and except the combination of iron with hydrogen, which is its normal condition, it is not the better for any admixture of other metals or elements, though for some purposes a small percentage of manganese, tungsten, or even a little silicon, are not disadvantageous. As a matter of practical fact, however, both sulphur and phosphorus are usually present, though in good samples in very small amount. By sufficient care they can be almost entirely eliminated, and are so in the best steel and wrought iron.

Steel, according to the purpose to which it is to be applied, contains, in chemical combination it is believed, from six-tenths to one and six-tenths per cent. of carbon, and should have no other ingredient. Wrought iron, apart from its ordinary combination with hydrogen, should be entirely free from sulphur, phosphorus, or silicon, and though for some purposes, a little manganese, tungsten, and a very small percentage of carbon may not prove disadvantageous, yet practically a pure iron is preferable to any alloy. Yet it is seldom actually free from impurities.

What is usually denominated pure iron, melts with great difficulty and only at a very much greater heat than either steel or cast iron. In actual practice it is never melted, but when the mass attains a pasty or semi-glutinous condition, it is by one process or another, either hammered, pressed, or squeezed till the impurities are forced out of it. Absolutely pure iron, *i. e.* iron free from hydrogen as well as other impurities, is one of the rarest metals in the world, and was isolated completely for the first time in 1860. It is a white metal very ductile, and tenacious and so soft as to be easily cut with a knife. The Bessemer process for eliminating the carbon both for producing wrought iron and steel, as now conducted, is as follows: A quantity of pig iron of some grade whose percentage of carbon is known, is melted in one or more reverberating furnaces, according to the size of the converting vessel to be used, which varies in capacity from five to twelve tons. When the metal becomes fluid, it is run into the converting vessel, to which is applied a strong blast of air, which combines with the carbon at an intense white heat. This is continued for about eight or ten minutes, until the whole of the carbon is consumed, when the blast is stopped. It is now wrought iron, requiring only to be squeezed or hammered to force out whatever impurities there may be in it. If, as is generally the case, it is deemed desirable to make it into the Bessemer steel or homogeneous steel or iron, as it is called on the continent, a quantity of metal, usually a pure pig iron, with a known quantity of carbon, is melted and run into the converting vessel to furnish carbon in the exact proportion to make the quality of steel desired, and this combining with the refined iron gives to the mass all the properties and characteristics of steel. This process, though practically a very rapid one, is liable to the objection which held against the old processes, that there is a time in the process of eliminating the carbon from the pig iron when the mass of iron has just enough carbon to form good steel; and that by this process that point is passed and the whole of the carbon expelled, the mass reduced to the condition of wrought iron, and then brought up to the condition of steel by the addition of a percentage of cast iron. This elimination and restoration of the carbon involves waste of time, of heat, and of iron; and hence efforts have been

made to convert pig iron and iron ore into steel by a single process.

Most of the methods proposed and abiding the test of actual manufacture are intended for the reduction of pig iron or ore to steel, and so come more properly under the head of steel; but a few of them are equally applicable to the production of wrought iron.

Among these were the ingenious suggestions of a New York chemist, Prof. A. K. Eaton, at first applied to the malleable cast iron to partially decarbonize it. He proposed the use of the native carbonate of zinc as a flux to furnish the oxygen to consume the excess of carbon. The objection to this process was two-fold—that the zinc combined in a small proportion with the iron,—and that the process was too expensive to be successful. He afterward proposed to substitute crude soda-ash for the zinc—a suggestion in the right direction; for the sodium will combine with the sulphur and phosphorus, and thus help to remove the impurities from the iron; but the crude soda ash is too uncertain in its composition, too full of impurities, and does not yield its oxygen with sufficient readiness to be practically the best flux for this purpose.

The process of Messrs. Whelpley & Storer seems one of the best of the numerous American processes. The oxide of carbon, *i. e.* coal gas, half or imperfectly burned, is the grand agent for making iron and steel from all the German and English furnaces, but the great difficulty has been to apply the powerful agent in such a way as to reduce directly from the ore without going through the pig iron manufacture, the wrought or bar iron, or steel, and free it from the impurities which exist more or less in all ores as well as in much of the pig iron. Messrs. Whelpley & Storer effect this by means of a machine of their own invention, which is really nothing less than the chemist's blow pipe on a grand scale. The oxide of carbon is generated at the moment of using it upon the mass of ore, by the injection of a column of hot air carrying an excessively fine dust of coal or charcoal. The ore spread out upon the floor of a common reverberating furnace receives the red hot blast, while it is rapidly stirred by the workman, and pure iron in minute grains is produced in any desired quantity, from 100 to 2,000 pounds or more at a heat. If the mass is balled up, squeezed, and passed through roller it is

bar iron of superior quality. If the time of the process is extended one hour, or even less, the iron absorbs carbon from the blast and becomes a light sponge of steel, which melts in the crucible or steel puddling furnace, and is cast into ingots of sound and pure metal. If continued still longer larger quantities of carbon are absorbed and the mass is converted into cast iron. The steel and cast iron as well as the bar iron are of superior quality, and remarkable tenacity and strength. Steel is made in this process in eight hours from crude ore to finished bar; and bar iron in little more than half that time. It is requisite to the success of the process that the carbon should be pulverized to an impalpable powder of the last degree of fineness, that thus infinitely subdivided and blown upon the mass it may carry condensed upon its surface nearly oxygen enough to consume it, and thus produce extreme rapidity, intensity, and thoroughness of combustion. This pulverization is effected, for the first time, by an ingenious machine invented by Messrs. Whelpley & Storer. What Messrs. Whelpley & Storer accomplish by their great blow-pipe and minute pulverization of carbon, Mr. C. W. Siemens effects in an entirely different way by his regenerating furnace; an apparatus requiring, in the first place, a somewhat more extensive and costly structure, but in the end accomplishing the same result of producing a rapid and intense heat and an atmosphere of oxide of carbon with a comparatively small expenditure of fuel. The necessity that the furnace linings should be almost absolutely indestructible by the intense heat generated makes the first cost of a regenerating furnace very heavy.

There are three distinct principles embodied in the Siemens' furnace, viz: the application of gaseous fuel; the regeneration of heat by means of piles of bricks alternately passed over by the waste gases and by the atmospheric air entering the furnace before their combustion; and the chemical action of these gases in combining with the impurities of the ore or the pig iron, and in modifying the quantity of carbon in combination with the iron, for the production of steel.

The gas producer is a brick chamber of convenient size, say six feet wide by twelve long, with its front wall inclined at an angle of 45° to 60° , according to the nature of the fuel used. The inclined plane is solid about half way down, and below this it is constructed as a grate with horizontal bars. It

is what is called a base-burner, the openings for introducing the coal being on the top or roof of this chamber, and the air which enters through the grate effects the combustion of the coal at the lowest points of the chamber. The products of this combustion rise and are decomposed by the superposed strata of coal above them; they are, moreover, mixed with a quantity of steam which is drawn in through the grate from a constant supply of water maintained underneath the latter. The steam in contact with the incandescent coal also decomposes and produces hydrogen and carbonic oxide gas, which are mixed with the gases produced by the coal direct. The whole volume of these gases is then conducted to the furnace itself by means of wrought iron pipes. The gases enter one of the regenerators. The regenerators are chambers packed with fire-bricks, which are built up in walls, with interstices and air-spaces between them (cob-house fashion as we should say) allowing of a free passage of gas around each brick. Each regenerator consists of two adjoining chambers of this kind, with air-passages parallel to each other, one passage destined for the gaseous fuel, and the other for the supply of atmospheric air required for combustion. Each furnace has two such regenerators, and a set of valves is provided in the main passages or flues, which permit of directing the gases from the producer to the bottom of either of the two regenerators. The gases after passing one regenerator arrive at the furnace, where they are mixed with the air drawn in at the same time, and produce a flame of great heat and intensity within the body of the furnace itself. They then pass, after combustion, into the second regenerator which forms a set of down flues for the waste gases, and ultimately leads them off into a common chimney. On their way from the furnace to the chimney the heated products of combustion raise the temperature of the fire-bricks, over which they pass, to a very high degree, and the gases are so much cooled that, at the base of the chimney, they do not produce a temperature of much more than 300° Fahrenheit. After a certain time the fire-bricks close to the furnace obtain a temperature almost equal to that of the furnace itself, and a gradually diminishing temperature exists in the bricks of the regenerator proportionate to their distance from the furnace. At this moment the attendant, by reversing the different valves of the furnace,

opens the heated regenerator for the entrance of the gaseous fuel and atmospheric air, at the same time connecting the other regenerator with the chimney for taking off the products of combustion. The entire current of gases through the furnace is thus reversed. The cold air from the atmosphere, and the comparatively cold gases from the producer, in passing over bricks of gradually increasing temperature as they approach the furnace become intensely heated, and when they are mixed in the furnace itself, enter into combustion under the most favorable circumstances for the production of an intense heat, often rising to 4000° Fahrenheit in the furnace. By changing the relative proportion of air and gas admitted through the flues, the nature of the flame may be altered at will. A surplus of oxygen from the introduction of more than half the volume of atmospheric air will produce an oxidizing flame, suited to the production of very pure bar iron. By the admission of a surplus of gas, on the contrary, the flame can be made of a reductive character and used accordingly for deoxidation.

Berard's process for making steel by gas, directly from pig iron, or ore, requires the Siemens furnace, which he constructs with the bottom formed into two parts each hollowed out like a dish, with a bridge between them, upon which the pigs introduced into the furnace receive a preliminary heating. The flame is maintained with a surplus of oxygen, and a quantity of pig iron is melted in one of the chambers or dishes. The oxidizing action of the flame decarbonizes and refines the pig iron, and after a certain time a second quantity of pigs is thrown into the second dish and melted there. The flame is now reversed in its direction; the oxidizing flame is made to enter at the side where the fresh pig is placed. In passing over this, and oxidizing the carbon, silicon, and other impurities in the iron, the flame loses its surplus oxygen, and becomes of a neutral, or at least only slightly oxidizing character. In this state it passes over the other bath of molten iron, now partly refined, and it continues to act upon the impurities without attacking the iron itself. At a certain moment this portion of iron is completely converted into steel, and that part of the furnace is then tapped, so as to make room for a fresh charge of pigs in that place. After that, the current of gases is again reversed, the second bath now entering into the position previously

taken by the first, and so the process is carried on continuously with two portions of iron—one freshly introduced and acted upon by the oxidizing flame, the other partly converted into steel and exposed to the neutral flame passing away from the first. M. Berard states that by protracting his process, and by adding spiegeleisen he can remove sulphur and phosphorus from the iron, and make steel from inferior pigs.

The Messrs. Martin of Sireuil, France, have, with a Siemens furnace, succeeded in melting with pig iron, old iron rails, wrought iron scrap, puddled steel, &c., in the proportion of two-thirds old rails to one-third pig iron, and have made from the compound an excellent and low-priced steel for rails.

Mr. Siemens himself patented, in 1868, and has since that time worked, a process for making natural or "raw" steel directly from the ore by means of a modification of his furnace. This can only be done successfully it is said by the use of the purest and best ores. Of other processes we may mention that of Mr. James Henderson, an eminent founder, of Brooklyn, N. Y., who, using the Bessemer process, has improved it by charging the blast furnace with a mixture of iron and Manganese ores, or any of the Manganiferous iron ores, thus incorporating the indispensable manganese, and causing it to exert its beneficial influence in purifying and refining the iron, at the beginning, instead of the end of the pneumatic process.

Mr. John Heaton of Nottingham, England, has been successful in oxidizing and removing the carbon and other impurities with great rapidity by the use of nitrate of soda with the molten metal in the following way: The "converter" consists of a large wrought iron pot, lined with fire clay; into the bottom of this a suitable quantity (about 6 per cent. usually of the weight of the pig iron or ore), of crude nitrate of soda combined with silicious sand, is introduced, and the whole covered with a cast-iron perforated plate. The molten pig is then poured in and in about two minutes the reaction commences; at first, brown nitrous fumes are evolved, and after a lapse of five or six minutes, a violent deflagration occurs attended with a loud roaring noise, and a burst from the top of the chimney of brilliant yellow flame, which, in about a minute and a half subsides as rapidly as it commenced. When all has become tranquil the converter is detached from the chimney and its contents emptied

upon the iron pavement of the foundry. The steel thus produced is pronounced by eminent metallurgists of excellent quality and practically free from impurities (the sodium combining with the sulphur and phosphorus), and it was satisfactorily demonstrated that uniformity of quality was attainable. The process is much more rapid than any other, but Mr. Bessemer asserts that the addition of the nitrate of soda makes the cost of a ton of steel about five dollars more than by his method. Mr. Hargreaves has patented a modification of this process, combining the nitrate of soda with hematite ore to form a paste, and claims that he thus obtains additional supply of oxygen. He states that he can make refined iron for puddling by the use of about 3 per cent. of nitrate of soda and six per cent. of hematite; steel by eight to ten per cent. of nitrate of soda and an equal weight of binoxide of manganese, and the best quality of wrought iron.

Mr F. Kohn, an English steel manufacturer, had, in 1868, made use of the Siemens regenerating furnace by a new process, melting a given quantity of the best and finest wrought iron in a bath of molten cast iron, carried to the highest heat of that furnace and thus making a pure steel at one heat without puddling or cementation. By his process old railroad iron, scrap iron, and scrap steel, can be converted at once into steel of the best quality for rails.

A Mr. Wilson, of Stockton-on-Tees, England, has patented a modification of the Siemens furnace which attains the same object with a still greater saving of fuel, by forcing air into the flue-bridge by a steam-jet, and causing it to pass into a conduit at the back of the furnace, and thence into the flame-bridge and up into a chamber from which, in a red-hot condition, it passes into and on to the incandescent fuel. By this improvement there is no necessity of grate-bars to the furnace, most of the fettling is saved, the steam from the heated water is at once decomposed and adds its quota to the intensity of the heat which burns up all the smoke and nearly all the cinder and slag. The saving in fuel is said to be about one-third over the Siemens furnace, and the heat is all applied directly to the removal of impurities and slag from the ores and cast iron.

The Shoenberger Junta Works, at Pittsburgh, Pa., have patented a method of making refined iron and steel by a new process which is both simple and ingenious, melting

in a blast furnace a quantity of crude cast iron of whatever quality they may have, they run it into a large kettle of a capacity of five tons and thence from it in a stream about a foot wide into a circular revolving trough, twelve inches wide and ten inches deep and let fall upon the molten metal from a hopper, pulverized iron ore, Lake Superior, Champlain, or Iron mountain, in sufficient quantity to cover the melted metal as fast as it is poured in. When the trough is full, and before the iron cools, it is broken up into slabs of suitable size for a heating furnace, when it is only necessary to heat it as blooms are heated, and put it through the machinery to produce the best quality of horse-shoe bars, or by a slight variation of the process, excellent steel.

Mr. David Stewart, of Kittaniny, Pa., has patented a method of freeing cast iron from its carbon, sulphur, phosphorus, &c., by pouring the melted metal at full heat from a height of perhaps thirty feet in a thin stream or shower upon the ground in such a way as that it shall receive the action of atmospheric air over its entire surface, or if preferred, through a cylinder thirty feet or more in height, and open at both ends, into which air is constantly forced. He claims to have tested this process very thoroughly and to be capable of making pure iron or steel by it without puddling and without retaining any cinder or impurities. Messrs. J. R. Bradley and M. D. Brown of Chicago, Ill., patented in 1868 eight recipes of ingredients to be added to melted scrap or malleable iron which they claimed would produce in each case the precise kind of steel wanted, and of the best quality. A Mr. J. Edwin Sherman, formerly a blacksmith of Bucksport, Me., but more recently a Government clerk at Washington, D. C., is said to have hit upon a method of converting iron into steel of great simplicity and cheapness, and, in the autumn of 1870, went by invitation to England to lay his process before the lords of the Admiralty.

Among the most remarkable discoveries of the present day, in relation to the manufacture of iron, we must count those by which iron ores, hitherto regarded as worthless, have proved either by new processes or by mixture with other ores, or with cast iron, the best of all factors for producing the purest wrought iron and steel. Thus far there are two of these instances worthy of special notice. In the township of North Codorus, York Co., Pa., there are extensive beds of a

peculiar micaceous iron ore; some of which were opened in 1854 or 1855, and attempts were made to make iron from them, but the ore contained but 41.5 per cent. of magnetic iron, and its reduction, owing to its peculiar combination, was attended with much labor and no profit; the ore beds were therefore abandoned. In 1868, it was discovered by accident that this unpromising ore, mixed with cast or pig iron of ordinary quality in the proportion of one to five or six in a reverberating furnace, produced by the ordinary puddling process, a pure steel of admirable quality and remarkably uniform in character. Having tested this by a very great number of experiments the discoverers purchased the Codorus ore beds, and put up a puddling furnace and rolling mill at York to carry on the business of making steel for railway rails, and other purposes. The analysis of the Codorus ore, as made by the eminent practical chemist, Otto Wurth, of Pittsburg, is as follows:

Silica,	37.35	Potash,	1.87
Alumina,	3.21	Magnetic Iron,	41.57
Manganese,	4.45	Peroxide of Iron,	10.46
Lime,	.74	Water and Loss,	.35
			100.00

Further experiments, conducted under the eye of the veteran iron master, J. N. Winslow, satisfied the owners of the ore that they could safely dispense with the puddling process and produce directly from the ore and cast iron the very best quality of steel. We have ourselves examined the steel and the wrought iron produced by this combination, and in every test to which it can be subjected, whether of tenacity, tensile strength, hardness, elasticity, or capacity of receiving and retaining the highest temper, it is unsurpassed by any steel or iron known to manufacturers. Whether wrought iron and steel can be made without puddling from a combination of this ore with other ores of good quality has not yet been ascertained, but we believe that it will. By the processes at present employed, the best of steel can be made with the use of fifteen or twenty per cent. of this ore at a cost of not above \$70 or \$75 per ton, and possibly lower.

Of the other ore, found at Port Leyden, Lewis Co., N. Y., still more remarkable things are stated. The following account of the ores and process of reduction, made in the New York *Tribune*, is believed to be fully authenticated. The steel is certainly of excellent quality

"The discovery of an inexhaustible bed of iron ore at Port Leyden, Lewis County, about 40 miles above Utica, a few years ago, tempted citizens of the latter-named place to invest about \$500,000 in the effort to establish the manufacture of iron there. The 'Port Leyden Iron Works' were a sad failure, and the entire amount of money invested in them was lost, as pig iron could not be produced from the ore. From this impracticable ore, steel is now produced, at one fusion, by a process invented by Prof. E. L. Seymour, a metallurgist and chemist, who resides in this vicinity. The outlines of the process are as follows: The ore is crushed, in something like an ordinary quartz-crusher, until it is reduced to about the fineness of rifle powder. It is then thrown into a revolving cylinder, in which are set numerous magnets. The ore is of the kind known as 'magnetic.' By an arrangement of small brushes, the metallic particles are separated from the refuse, which is principally stony and earthy matter in the shape of fine dust. The application of certain chemicals and fusion by charcoal are the next steps in the process, and the immediate product is pure steel, ready for molding into 'ingots. Specimens of steel thus manufactured and converted into finely-tempered table cutlery, and other articles, and the certificate of a well-known cutler of Brooklyn, who made the articles, that it is as good steel as he ever worked, and adapted to all cutlery purposes, have been exhibited. The estimated cost of this steel is less than four cents. By the Seymour process, it is claimed that the aim of iron-masters and chemists for the last 200 years is accomplished—viz: to rid iron of its arch enemies, sulphur and phosphorus—the former rendering the metal what is technically called 'red-short,' so that it flies to pieces under the hammer when at a red heat, though it may be quite strong when cold; while the least quantity of phosphorus renders the metal 'cold-short,' making it weak and brittle when cold, though quite strong when hot.

"The Port Leyden Works are about one-eighth of a mile from the railroad and the canal. The buildings, furnaces, etc., were erected several years ago at great expense; and for some time there have lain in the forest near by nearly 100,000 bushels of charcoal, the overplus of what was made before it was found that iron could not be produced from the ore by the old processes."

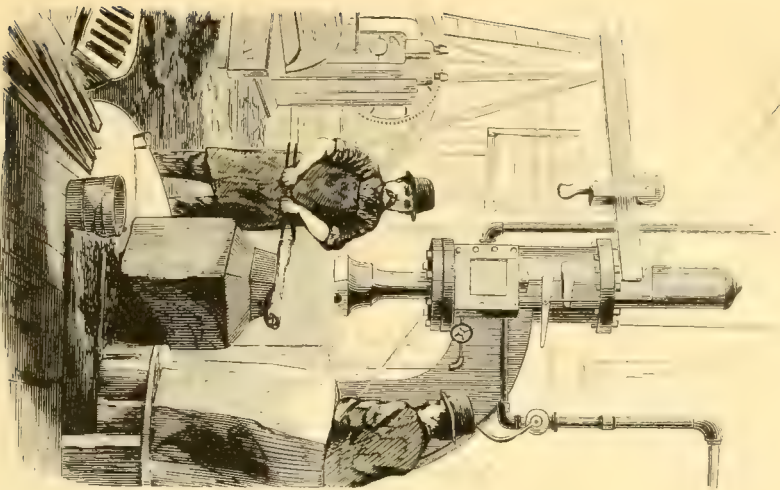
It has recently been discovered that there are extensive veins of a peculiar coal, called block coal in Indiana, which is remarkably adapted to the production of the best iron. In its constituents and its working, it is very nearly a pure charcoal and containing neither sulphur nor phosphorus, it does not impart to iron in the smelting process any ingredient which impairs its value. These veins of block coal are of great thickness, and extend widely over the central and southern part of the state. It has not thus far been discovered in any other state. Indiana has no great variety of iron ores, but her railroad facilities present, and prospective, for bringing the Missouri ores from Pilot Knob and Iron Mountain and the rich hematitic ores from the Lake Superior region in Michigan, are such that with this excellent coal, her citizens can manufacture the finest qualities of iron and steel at considerably lower prices than they can be produced for, elsewhere. As a consequence numerous furnaces have been erected in 1870 and 1871, along the line of the block coal veins, and many more are now going up. The improved processes and new discoveries to which we have alluded, while they will materially reduce the cost of making steel, do not, thus far, greatly lower the cost of producing iron, except in Indiana, and hence the reduction of ten per cent. on iron and iron manufactures in the new tariff of 1872, may impede the progress of this desirable manufacture, now fast attaining to the first rank among our national productions.

Though the total production of pig iron each year is now very definitely ascertained, there is more difficulty in learning the details of the other branches of iron manufacture. The rolling mills are really unceasing in numbers and in their aggregate production of rails both iron and steel, but the re-rolling of old rails is a large and yet very variable item in their annual amount of work, and it is difficult to ascertain with any considerable exactness what number of tons of new rails are produced by each mill. The aggregate product in 1871 was stated in round numbers at about 275,000 tons of iron and 180,000 tons of steel rails. This latter item will, undoubtedly, be largely increased during the present and coming years.

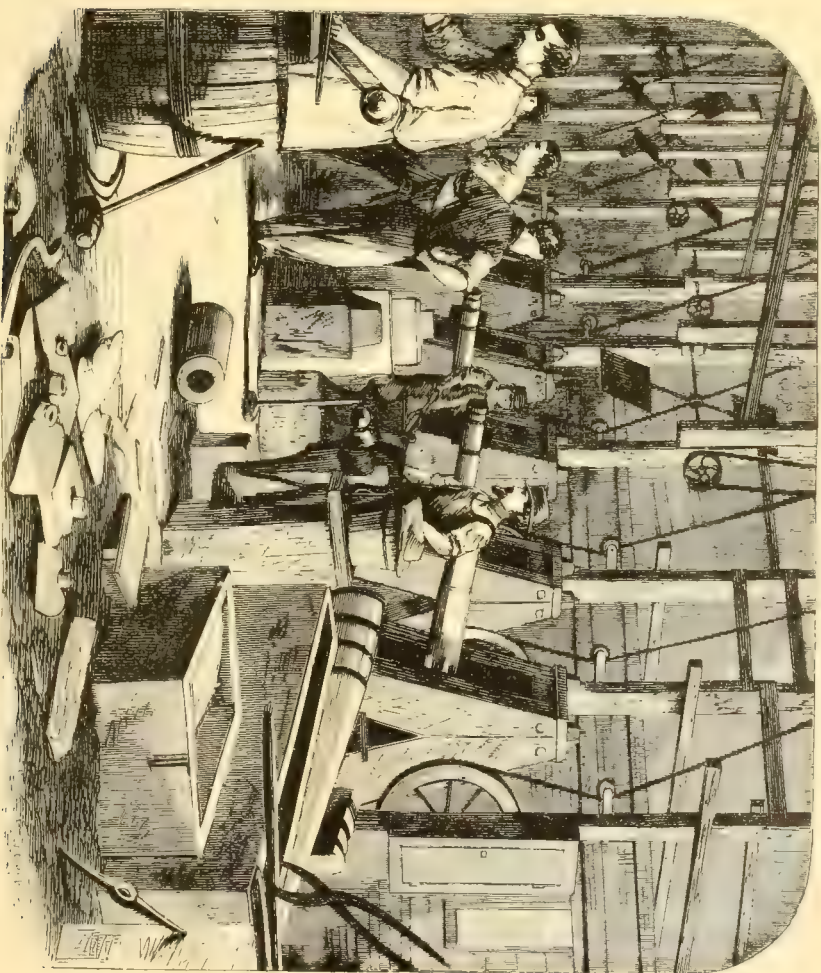
SHEET IRON.—For making sheet iron the

bars are gradually spread out between smooth rolls, which are brought nearer together as the metal grows thinner. The Russians have a method of giving to sheet iron a beautifully polished surface, and a pliability and durability which no other people have been able to imitate. All attempts that have been made to learn the secret of this process have entirely failed, and the business remains a monopoly with the Russians. The nearest imitation of this iron is produced at Pittsburgh, Pennsylvania, and several eastern establishments, by what is called Wood's process. This consists in rolling the common sheet at a certain temperature while it is covered with linseed oil. A very fine surface is thus produced, but the pliability and toughness of the Russian iron are wanting, even though the sheets are often annealed in close vessels, and the glaze and color are also inferior. Sheet iron is now extensively prepared for roofing, and other uses requiring exposure to the weather, by protecting its surface with a coating of zinc. This application is an American invention, having been discovered in 1827, by the late Prof. John W. Revere, of New York. In March, 1859, he exhibited, at a meeting of the Lyceum of Natural History, specimens of iron thus protected, which had been exposed for two years to the action of salt water without rusting. He recommended it as a means of protecting the iron fastenings of ships, and introduced the process into Great Britain. Sheets thus coated are known as galvanized iron, though the iron is now coated with zinc by other means as well as by the galvanic current. One method, that of Mallet, is to place the sheets, after they are well cleaned by acid and scrubbed with emery and sand, in a saturated solution of hydrochlorate of zinc and sulphate of ammonia; and after this in a bath composed of 202 parts of mercury and 1,292 of zinc, to every ton weight of which a pound of potassium or sodium is added. The compound fuses at 680° Fahrenheit, and the zinc is immediately deposited upon the iron surface. Another method is to stir the sheets in a bath of melted zinc, the surface of which is covered with sal ammoniac.

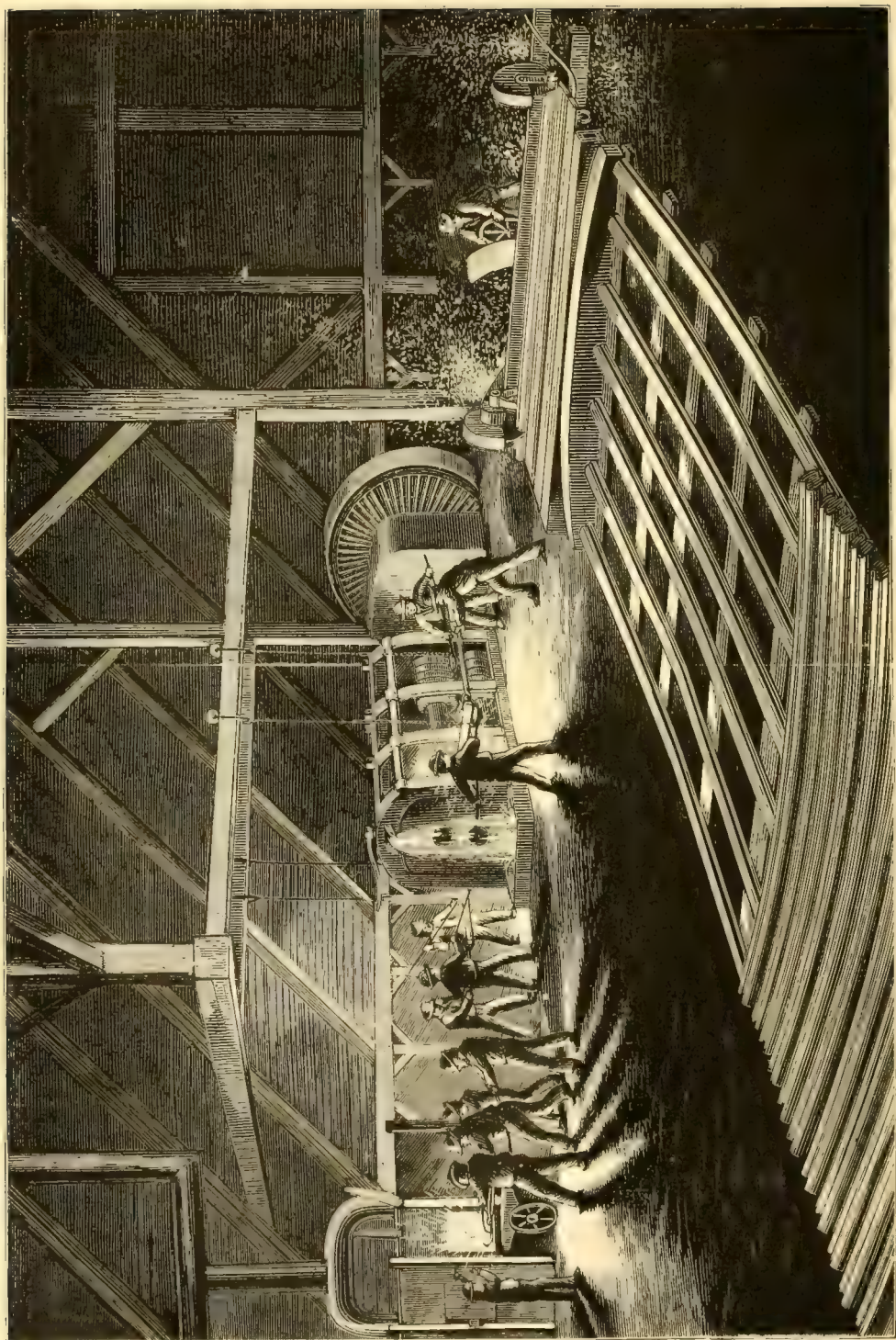
The use of heavy sheets or plates for building purposes is also a recent application of iron, that adds considerably to the demand for the metal. The plates are stiffened by the fluting, or corrugating, which they receive in a powerful machine, and may be protected by a coating of zinc. Their prep-



STEAM HAMMER.



FORGES AND TRIP HAMMERS.



THE TIME REQUIRED TO ROLL A R. ROAD RAIL FROM 20 TO 30 FEET LONG, AND TO SAW OFF THE ENDS TO PROPER LENGTH, IS FROM $1\frac{1}{4}$ TO 2 MINUTES.

aration is largely carried on in Philadelphia; and in the same works a great variety of other articles of malleable iron, for domestic and other uses, are similarly protected with zinc, as window shutters, water and gas pipes, coal scuttles, chains for pumps, bolts for ships' use, hoop iron, and telegraph and other wire.

The production of the principal boiler-plate and sheet iron establishments of the United States is thus given for the year 1856:—

	Tons.
East of the Delaware there are but two mills, both of which are in Jersey City. Product in 1856.....	550
In E. Pennsylvania, on the Schuylkill and lower Susquehanna, 25 mills.....	21,218
Near Wilmington, Delaware, 3 mills.....	1,374
Between Wilmington and Baltimore, 7 mills.....	2,998
Pittsburg, Penn., 14 mills. Sheet iron, 6,437; boiler iron, 3,212; besides bars, rods, hoops, and nails.....	9,649
Sheet iron at the Sharon mill, Mercer Co. Penn.	500
Bloom mill, Portsmouth, S. Ohio, and Globe mill, Cincinnati, about.....	2,000
	38,289

A mill for boiler plate has been erected at St. Louis.

IRON WIRE.—The uses of iron wire have greatly increased within a few years past. The telegraph has created a large demand for it; and with the demand the manufacture has been so much improved, especially in this country, that the wire has been found applicable to many purposes for which brass or copper wire was before required. It is prepared from small rods, which are passed through a succession of holes, of decreasing sizes, made in steel plates, the wire being annealed as often as may be necessary to prevent its becoming brittle. In this branch the American manufacturers have attained the highest perfection. The iron prepared from our magnetic and specular ore is unequalled in the combined qualities of strength and flexibility, and is used almost exclusively for purposes in which these qualities are essential. But where stiffness combined with strength is more important, Swedish and Norwegian iron also are used. Much of the iron wire now made is almost as pliable as copper wire, while its strength is about 50 per cent. greater. In Worcester, Mass., a large contract has been satisfactorily filled for No. 10 wire, one of the conditions of which was that the wire, when cold, might be tightly wound around another wire of the same size without cracking or becoming rough on the surface. Such wire is an ex-

cellent material for ropes, and considerable American iron is already required for this use, especially for suspension bridges. Wires are also used for fences, and are ingeniously woven into ornamental patterns. The so-called "netting fence," thus made, can be rolled up like a carpet. For heavier railing and fences, as for the front yards of houses, for balconies, window guards, etc., iron bars and rods are now worked into ornamental open designs, by powerfully crimping them and weaving them together like wires.

NAILS.—Among the multitude of other important applications of malleable iron, that of nail making is particularly worthy of notice, as being in the machine branch of it—the preparation of cut nails—entirely an American process. Our advance in this department is ascribed to the great demand for nails among us in the construction of wooden houses. In England, even into the present century, nails were wrought only by hand, employing a large population. In the vicinity of Birmingham it was estimated that 60,000 persons were occupied wholly in nail making. Females and children, as well as men, worked in the shop, forging the nails upon anvils, from the "split iron rods" furnished for the purpose from the neighboring iron works. The contrast is very striking between their operations and those of the great establishments in Pennsylvania, consisting of the blast furnaces, in which the ores are converted into pig; of the puddling furnaces, in which this is made into wrought iron; of the rolling and slitting mills, by which the malleable iron is made into nail-plates; and of the nail machines, which cut up the plates and turn them into nails—all going on consecutively under the same roof, and not allowing time for the iron to cool until it is in the finished state, and single establishments producing more nails than the greater part of the workshops of Birmingham fifty years ago. Public attention was directed to machine-made nails as long ago as 1810, by a report of the secretary of the treasury, in which he referred to the success already attained in their manufacture in Massachusetts. "Twenty years ago," he states, "some men, now unknown, then in obscurity, began by cutting slices out of old hoops, and, by a common vice gripping these pieces, headed them with several strokes of the hammer. By progressive improvements, slitting mills were built, and the shears and the heading tools were perfected, yet much

labor and expense were requisite to make nails. In a little time, Jacob Perkins, Jonathan Ellis, and a few others, put into execution the thought of cutting and of heading nails by water; but being more intent upon their machinery than upon their pecuniary affairs, they were unable to prosecute the business. At different times other men have spent fortunes in improvements, and it may be said with truth that more than a million of dollars have been expended; but at length these joint efforts are crowned with complete success, and we are now able to manufacture, at about one-third of the expense that wrought nails can be manufactured for, nails which are superior to them for at least three-fourths of the purposes to which nails are applied, and for most of those purposes they are full as good. The machines made use of by Odiorne, those invented by Jonathan Ellis, and a few others, present very fine specimens of American genius." The report then describes the peculiar character of the cut nail—that it was used by northern carpenters without their having to bore a hole to prevent its splitting the wood; that it would penetrate harder wood than the wrought nail, etc. At that time, it states, there were twelve rolling and slitting mills in Massachusetts, chiefly employed in rolling nail plates, making nail rods, hoops, tires, sheet iron, and copper, and turning out about 3,500 tons, of which about 2,400 tons were cut up into nails and brads. From that time to the present the manufacture of nails by machinery has been a profitable branch of industry in the south-eastern part of Massachusetts, the iron and the coal being furnished from the middle Atlantic states, and the nails, in great part, finding a market at the south. The following table presents the number of nail mills in operation in 1856. The smaller establishments are gradually going out of the business, and this is becoming more concentrated in the coal and iron regions, thus saving the cost of transportation in these heavy articles. The manufacturers of New England, however, ingeniously divert a part of their operations to the production of smaller articles, with which the cost of transportation is a less item in proportion to their value, such as tacks, rivets, screws, butts, wire, and numerous finished articles, the value of which consists more in the labor performed upon them and in the use of ingenious machinery than in the cost of the crude materials employed.

NAIL FACTORIES IN THE UNITED STATES, AND THEIR PRODUCTION IN 1856.

	Tons.
In south New England, 12 mills, nails principally.....	25,000
Troy, New York.....	4,000
Rockaway, Boonton, New Jersey, nails and spikes.....	8,250
Southern New Jersey.....	4,167
On the Schuylkill, 5 mills, about.....	9,000
On the lower Susquehanna, 2 mills, about.....	2,600
Middle Pennsylvania, 2 mills, about.....	2,000
Maryland, 2 mills.....	2,155
Richmond, 1 mill.....	1,075
Pittsburg, 14 mills, nails, spikes, rivets, tacks.....	14,195
Wheeling, 2 mills.....	6,465
Ironton, southern Ohio, 1 mill.....	775
Mahoning Co., N. E. Ohio, 1 mill.....	380
Buffalo.....	1,400
Total.....	81,462

The number of nail machines employed in these mills was 2,645.

A great variety of machines have been devised for nail making, very ingenious in their designs, and all too complicated for description. The iron is rolled out into bars for this manufacture, of 10 or 12 feet in length, and wide enough to make three or more strips, each one of which is as wide as the length of the nail it is to make. The cutting of these strips from the wider bars is the special work of the slitting mill, which is, in fact, but a branch of the rolling operation, and carried on in conjunction with it. The slitting machine consists of a pair of rolls, one above the other, each having 5 or 6 steel disks upon its axis, set as far apart as the width required for the nail-rod. Those upon one roll interlock with those upon the other, so that when the wide bar is introduced it is pressed into the grooves above and below, and cut into as many strips as there are spaces between the disks. This work is done with wonderful rapidity, several bars being passed through at once. In the nail factory each nail-making machine works upon one of these strips, or nail-rods, at a time, first clipping off a piece from the end presented to it, and immediately another, as the flat rod is turned over and the end is again presented to the cutter. The reason of turning it over for each successive cut is because the piece cut off for the nail is tapering, in order to make it a little wider at the end intended for the head than at the other, and thus, making the wider cut on alternate sides of the rod, this is regularly worked up into pieces of the proper shape. In the older operations a workman always sat in front of each machine, holding the

rod and turning it over with every clip; but by a modern improvement this work is also done by mechanical contrivance. Each piece, as fast as it is clipped off, disappears in the machine. There it is seized between powerful jaws, and the head is pressed up from the large end by the short, powerful motion imparted to the piece of apparatus called the header. As it is released, it slides down and drops upon the floor, or in a vessel placed to receive the nails.

Machinery has been applied in the United States to the manufacture of horse-shoe nails, according to a number of patented plans. Of these, the most successful is probably that invented about the year 1848, by Mr. L. G. Reynolds, of Providence; also the inventor of the solid-headed pin. The form of this nail could not be given as in ordinary cut nails by the cutter, but the sides required to be pressed as well as the head. This involved the use of movable plates of suitable figure; and as it was found that the nails could not be shaped except when the metal was softened by heat, the plates must necessarily be of the hardest steel, and protected as effectually as possible from the effects of constant working of heated iron. These difficulties were fully overcome, and the nails, after being turned out, were toughened by annealing, giving them all the excellent qualities of hand-made nails, with the advantage of perfect uniformity of size, so that one nail answers as well as another for the holes in the horse-shoes. They are, moreover, made with great rapidity, each machine producing half a ton of nails in 12 hours. The process has been taken to Europe, and is there in successful operation. Spikes, also, have been made and headed in similar machines; and among all small articles in iron, none, perhaps, has proved so profitable to the inventor as the hook-headed spike, used for holding down, by its projecting head, the edge of the iron rails to the sill. This was the invention of Mr. Henry Burden, of Troy, whose machines for wrought-iron spikes and for horse-shoes have also proved very successful. By the latter, perfect shoes are turned out at the rate of 60 in a minute. This process has been introduced in most of the European countries.

STEEL.

As already remarked, steel differs in composition from metallic iron only by containing from $\frac{1}{4}$ to $1\frac{1}{2}$ per cent. of carbon, and

from cast-iron by the latter containing a larger proportion of carbon, which may amount to 5.5 per cent. To readily convert these varieties into each other is an object of no small importance, for their properties are so entirely distinct, that they really serve the purposes of three different metals. Steel is particularly valuable for its extreme hardness, fine grain, and compact texture, which admits of its receiving a high polish. It is the most elastic of metals, and much less liable to rust than iron. It has the peculiar property of assuming different degrees of hardness, according to the rapidity with which it is chilled when heated; and it may be melted and run into moulds like cast iron, and the ingots thus prepared may be hammered, rolled, and forged into shapes like wrought iron; and these may finally be tempered to any degree of hardness desired. Differing so little in composition from metallic iron and from cast iron, and being so universally in demand for a multitude of uses, it would seem that it ought to be produced as cheaply as one or the other of the varieties, between which its composition places it. But this is far from being the case. While pig iron is worth only \$20 to \$30 per ton, and bar iron \$60 to \$90, cast steel in bars is worth from \$250 to \$300 per ton. This is chiefly owing to the difficulty of procuring in large quantities steel of uniform character, which the consumers of the article can purchase with perfect confidence that it is what they require and have been accustomed to use. The English boast, with good reason, of the position they occupy in this manufacture, which is almost a monopoly of the steel trade of the whole world. Though producing themselves little or no iron fit for making alone the best steel, they have imported enough of the Swedish and Norwegian bar iron to insure a good quality, and have been especially cautious to render this as uniform as possible. Their method of manufacture is to introduce carbon into the wrought iron by what is called the cementing process. On the continent of Europe steel is made to some extent, in Silesia and Styria, by removing from cast iron enough of its carbon to leave the proper proportion for steel, and then melting the product and casting it into ingot moulds. But this cheaper method does not appear to have been taken up in Great Britain. In the United States several processes are in operation, two of which are peculiarly American. The ce-

menting method, as conducted in England, has been longest known, and will be first described. The cementing furnace is a sort of oven, furnished with troughs or shelves, upon which charcoal dust is laid for receiving the bars. These are placed edgewise in the charcoal, half an inch apart, and the spaces are filled in with more sifted coal. Enough is added to cover the bars, and upon this a second tier is laid in the same way, and so on till the trough is filled with several tons of iron, all of which is perfectly excluded from the air. The trough being secured with others in the oven, a fire is started under them. In about six days the bars have absorbed enough carbon to acquire the properties of the softer kinds of steel, such as are used for saws and springs. In a day or two longer it answers for cutting instruments, and some time after this it gains in hardness, so as to be fitted for cold chisels, for drills such as miners use, etc. Its character is ascertained at any time by drawing out one of the bars. After the change is effected the fire is extinguished, and about a week is allowed for the furnace and its contents to cool. When at last the bars are obtained, their surface is found to be covered with blisters, whence the steel is called blistered steel. The fibrous texture of the iron has given place to a granular structure, but is so irregular and uneven that the metal requires further treatment to perfect it. To make the English shear-steel, so called from its being originally employed for shears used in sheep-shearing, the bars are cut into lengths of a foot and a half, and a number of these are bound together to make a faggot. This is brought to a welding heat, and drawn down first under a forge-hammer, and then under the tilt-hammer. This weighs from 150 to 200 pounds, and strikes from 150 to 360 strokes a minute. The rapidity of the work keeps the steel at a glowing heat, and it is soon fashioned into a dense bar of smooth surface, susceptible of a polish, and suited for the manufacture of cutting instruments. Sometimes it is cut into pieces to be refaggoted, and drawn down again into bars, which are then called double-shear.

Cast steel is a still more dense and perfect variety. It is prepared by melting, in large crucibles, blistered steel broken into small pieces, and pouring the metal into moulds. These are then worked into shapes by the forge hammer and the rolls.

The American methods of making steel were discovered by Prof. A. K. Eaton, of New York, and the one now employed by the Damascus Steel Company was practically demonstrated by him in Rochester and its vicinity in 1851 and 1852. This consists in carbonizing and melting malleable iron in crucibles at one operation, by introducing into the pot with the pieces of iron a carbonaceous salt, such as the ferro-cyanide of potassium, either alone or in combination with charcoal powder. At an intense heat this salt rapidly carbonizes the iron, which thus first becomes steel, then fuses, and is poured into moulds. The quantity of the salt employed is proportional to the quantity of the iron and the quality of the steel required. The operation is successfully carried on in different establishments in New Jersey, New York, and Pennsylvania, and cast steel of the very best quality is produced at less expense than the article has ever before cost in this country. For bar steel, according to the prospectus of the company, the best charcoal-made iron is employed, costing \$85 per ton, and this, together with the coal used for fuel, the chemical materials, the melting, crucibles, and hammering, make the whole cost about \$142 per ton, while that of the imported article is \$300 or more. The great difficulty in the process is to obtain suitable crucibles for withstanding the intense heat required to melt the charge of 60 lbs. of malleable iron. Those in use are blue-pots, costing \$1.60 each. Though made of the best of plumbago, they stand only two or three meltings.

The other process, which is just now introduced into practice, is based upon the property of carbonate of soda to remove from cast iron the carbon it contains, when the metal is kept for a few hours in a bath of the melted alkali. The decarbonizing effect is in part due to the action of the oxygen of the alkaline base, which is given up to the carbon of highly heated cast iron, but principally to the decomposition of the combined carbonic acid, which gives to the carbon one of its atoms of oxygen, and is resolved into carbonic oxide. This property of soda was discovered by Prof. Eaton in 1856, but the fact that the carbonated or bicarbonated alkalies act principally by virtue of their carbonic acid, was only recently recognized and made practically available by him. The action of soda or its carbonates is not limited to the removal of the excess of carbon in cast iron. It combines with and removes those impurities which would prove

fatal to the quality of the steel if remaining in it, as sulphur, phosphorus, and silicon; and the method thus admits of the use of crude irons, such as could never be applied to this manufacture by any other mode. The cast iron, in the form of thin plates, having been kept at a bright red heat in the bath of melted carbonate for a sufficient time, which is determined by occasionally taking out and testing some of the pieces, is transferred to the crucible, and is then melted and poured into moulds, as in the ordinary method of making cast steel. The crucibles, not being subjected to greater heat than is required for melting cast steel, endure much longer than when employed for melting wrought iron in the carbonizing process; thus a great saving is effected in the expense of the conversion; and this economy is still further increased by the use of a crude material, costing only from \$20 to \$30 per ton, in place of the superior qualities of wrought iron, worth \$85 per ton. So great, indeed, is the saving, that the cost of the cast steel, when obtained in ingots, is found not to ex-

ceed the cost of the malleable iron employed in the other process.

STATISTICS.—The records of the production of iron of the United States are very incomplete up to the year 1854. Even the census returns are highly defective, as they often make no distinction between iron made from the ore and the products of the secondary operations of remelting and puddling. The first systematic attempts to obtain complete accounts of the business, as conducted in Pennsylvania, were made in 1850 by the Association of Iron Manufacturers, organized in Philadelphia. Mr. Charles E. Smith collected the returns, and published them in a small volume, together with other papers relating to the manufacture. In 1856 the association, through their secretary, Mr. J. P. Lesley, and their treasurer, Mr. C. E. Smith, obtained full returns from 832 blast furnaces, 488 forges, and 225 rolling mills in the United States, besides others in Canada, exhibiting their operations for the preceding three years. Some of these results are presented in the following tables:—

NO 1.—TABLE OF IRON WORKS IN OPERATION AND ABANDONED IN 1858.

	Anthracite Furnaces.	Charcoal and Coke Furnaces.	Abandoned Furnaces.	Bloomary Forges.	Abandoned Bloomaries.	Refinery Forges.	Abandoned Refineries.	Rolling Mills.	Abandoned.
Maine.....	..	1	..	..	..	..	..	1	..
New Hampshire....	..	1	..	..	..	1	..	..	..
Vermont.....	..	5	..	5	..	..	..	1	..
Massachusetts.....	3	7	..	..	..	5	1	19	..
Rhode Island.....	..	..	..	..	..	..	..	2	..
Connecticut.....	1	14	..	..	..	6	..	5	..
New York.....	14	29	6	42	1	3	2	11	5
New Jersey.....	4	6	12	48	29	2	..	10	1
Pennsylvania.....	93	150	102	1	3	110	44	91	5
Delaware.....	..	..	1	..	..	..	..	4	..
Maryland.....	6	24	7	..	..	..	..	13	..
Virginia.....	..	39	56	..	..	43	..	12	..
North Carolina.....	..	3	3	36	..	..	..	1	1
South Carolina.....	..	4	4	2	..	..	..	3	..
Georgia.....	..	7	1	4	..	..	..	2	..
Alabama.....	..	3	1	14	..	..	..	..	..
Tennessee.....	..	41	33	50	2	9	3	3	2
Kentucky.....	..	30	17	..	..	4	9	8	..
Ohio.....	..	54	26	..	..	..	5	15	..
Indiana.....	..	2	3	..	..	..	..	1	..
Illinois.....	..	2	..	..	..	..	..	1	..
Michigan.....	..	7	..	3	..	..	..	2	..
Wisconsin.....	..	3	..	..	..	..	..	..	..
Missouri.....	..	7	..	..	..	3	..	5	1
Arkansas.....	..	..	..	1	..	..	..	..	..
Total.....	121	439	272	206	35	186	64	210	15
In working order, 560	Furnaces,	389	Forges,	210	Rolling	Mills.	Total,	1,159	
Abandoned,	272	"	99	"	15	"	"	386	
In all,	832	"	488	"	225	"	"	1,545	

The production of the blast furnaces in the different iron districts for the years 1854, 1855, and 1856, is exhibited in Table No.

2; their arrangement being according to the fuel employed and the quantities of iron produced in each district in 1856:—

TABLE NO. 2.—PRODUCTION OF PIG IRON.

Fuel.	District.	1854.	1855.	1856.
Anthracite.....	Pennsylvania.....	208,603	255,326	306,972
".....	Out of Pennsylvania.....	99,067	87,779	87,537
Charcoal and Coke.....	S. Ohio.....	56,081	47,982	70,145
".....	E. Kentucky.....	22,929	16,180	21,661
".....	W. Pennsylvania.....	78,927	59,388	59,597
".....	N. Ohio.....	11,289	9,926	17,056
".....	E. Pennsylvania.....	62,724	60,596	52,775
Charcoal.....	W. Tennessee.....	37,918	33,683	32,163
".....	W. Kentucky.....	12,236	12,644	14,902
".....	S. Indiana.....	1,400	1,500	1,800
".....	S. Illinois.....	1,500	1,500	1,800
Charcoal and Coke.....	S. W. Pennsylvania.....	11,052	15,217	29,400
".....	N. W. Virginia.....	1,930	2,342	1,467
".....	Maryland.....	36,658	36,309	30,998
Charcoal.....	E. of the Hudson.....	30,420	32,826	29,937
".....	N. and W. New York.....	19,197	19,736	18,847
".....	Missouri.....	7,591	10,181	10,138
".....	S. New York and N. New Jersey.....	13,435	7,901	5,688
".....	E. and Middle Virginia.....	5,880	6,926	5,730
".....	North and South Carolina.....	1,820	1,880	1,956
".....	Georgia.....	2,391	2,715	2,807
".....	E. Tennessee and Alabama.....	1,845	1,516	2,931
".....	Michigan.....	990	90	3,778
".....	Wisconsin.....	.....	.....	2,500
Total production of pig iron in the United States.....Tons.		725,823	728,973	812,739

TABLE NO. 3.—DISTRIBUTION OF THE FURNACES BY STATES.

I. ANTHRACITE FURNACES.		
No.	States.	Product. Tons.
3	Massachusetts.....	4,443
1	Connecticut.....	0
14	New York.....	47,257
4	New Jersey.....	26,117
93	Pennsylvania.....	306,972
6	Maryland.....	10,720
121		394,509
II. COKE FURNACES.		
21	Pennsylvania.....	39,953
3	Maryland.....	4,528
24		44,481
III. RAW BITUMINOUS COAL FURNACES.		
6	Pennsylvania.....	8,417
13	Ohio.....	16,656
19		25,073
IV. CHARCOAL FURNACES.		
1	Maine.....	2,100
1	New Hampshire.....	0
5	Vermont.....	2,420
7	Massachusetts.....	8,564
14	Connecticut.....	12,876
29	New York.....	21,774
6	New Jersey.....	2,100
143	Pennsylvania.....	96,154
21	Maryland.....	26,470
39	Virginia.....	14,828
3	North Carolina.....	450
4	South Carolina.....	1,506
7	Georgia.....	2,807
3	Alabama.....	1,495
41	Tennessee.....	28,476
30	Kentucky.....	36,563
41	Ohio.....	70,355
2	Indiana.....	1,800
2	Illinois.....	1,900
7	Missouri.....	10,138
3	Wisconsin.....	2,500
7	Michigan.....	3,678
416		348,954

	No. of Furnaces.	Tons.
Anthracite, as above.....	121.....	394,509
Coke, ".....	24.....	44,481
Raw Coal, ".....	19.....	25,073
Charcoal, ".....	416.....	348,954
Total pig.....	580.....	813,017

TABLE NO. 4.—PRODUCT OF WROUGHT IRON DIRECT FROM THE ORE, 1856.

Bloomeries.	States.	Product. Tons.
5	Vermont.....	1,650
42	New York.....	18,710
48	New Jersey.....	4,487
36	North Carolina.....	1,182
2	South Carolina.....	640
4	Georgia.....	40
14	Alabama.....	252
50	Tennessee.....	1,222
3	Michigan.....	450
204		28,633
Pig iron as above.....		812,917

Grand total production of iron from
the ore in 1856.....841,550

In addition to this amount, the importations for the year 1856 of iron designed for manufacture are estimated at 363,998 tons, consisting of Scotch pig, 55,403 tons; rolled and hammered iron, 298,275 tons; and scraps, 10,320 tons; and if to this be added for old rails reworked, 100,000 tons, and for scrap, 25,000 tons, the total amount of iron entering into domestic consumption was 1,330,548 tons. The importation of railroad iron not included in the above was 167,400 tons. The proportion of foreign iron introduced into the general consumption, not including rails, was about 30 per cent.

The value of the immediate products of the manufacture of domestic iron is thus given at the prices current in 1856:—

Foundry pig.....	302,154 tons a	\$27,	\$8,158,158
Foundry cold-blast charcoal iron for car wheels, &c....	35,000 " a	35,	1,225,000
Rails.....	142,555 " a	63,	8,980,965
Boiler and sheet....	38,639 " a	120,	4,636,680
Nails.....	81,462 " a	84,	6,842,808
Bar, rod, hoop, and band.....	235,425 " a	65,	15,302,625
Hammered iron....	21,000 " a	125,	2,625,000
Total.....			\$47,771,236

Mr. Smith presents the following conclusion to the "Statistical Report of the Iron Manufacture:" "The great facts demonstrated are, that we have nearly 1,200 efficient works in the Union; that these produce annually about 850,000 tons of iron, the value of which in an ordinary year is \$50,000,000; of this amount the portion expended for labor alone is about \$35,000,000."

The following table gives the different kinds of pig metal and the total amount produced in each year since 1856:

YEAR.	Tons Anthracite Pig Iron.	Tons raw Bituminous Coal and Coke Pig Iron.	Tons Charcoal Pig Iron.	Total.
1857.	390,365	77,451	330,321	798,137
1858.	361,440	58,351	295,413	705,095
1859.	471,745	84,841	284,041	840,627
1860.	515,411	122,228	278,551	915,770
1861.	407,229	137,037	195,278	739,544
1862.	470,455	130,687	186,660	787,662
1863.	577,638	157,961	212,005	947,604
1864.	681,018	209,626	241,834	1,132,478
1865.	479,088	189,682	202,142	871,282
1866.	749,067	266,996	332,280	1,348,343
1867.	799,638	318,617	344,341	1,462,666
1868.	893,000	340,010	370,000	1,603,000
1869.	971,150	553,441	392,149	1,916,740
1870.	840,000	530,010	360,000	1,730,000
1871.	875,999	650,000	375,000	1,900,000

The manufacture of iron rails has existed for nearly twenty-five years in the United States, but has only assumed any great magnitude since 1854. The annual production of American rails since 1861 has been: 1861, 189,818 tons; 1862, 213,912; 1863, 275,768; 1864, 335,369; 1865, 356,292; 1866, 430,778; 1867, 467,108; 1868, 506,714; 1869, 593,586; 1870, 624,000; 1871, 722,000 tons. In the last named year, 572,386 tons were imported from Great Britain.

The census of 1860 gives the following statistics of the iron production and manufacture of that year. There had been very little progress in the production of iron in the country for several years previous, in consequence of the very low rate of duty at which foreign railroad and other iron was admitted.

Iron wire.....	1,643,857
Iron forgings.....	1,907,460
Car wheels.....	2,033,350
Iron castings of all kinds....	36,132,033

\$97,148,705

The opening of the war, in 1861, gave an extraordinary impetus to iron production and manufacture. The tariff and other causes reduced the importation to a minimum, while the demand for iron for the fabrication of small arms and cannon; for the construction of the large fleet of iron-clads, and for the other war vessels; for the building of locomotives, the casting of car wheels and furnishing the vast quantity of railroad iron needed to repair the old tracks destroyed by the contending armies, and to lay the tracks of new roads, extended the business vastly beyond all former precedent; and the requirement that the Pacific railroad and its branches shall be constructed solely of American iron, as well as the increase in its use for buildings, and for shipping, have maintained it in a prosperous condition.

The manufacture of steel and the other manufactures of iron, aside from those already enumerated, brought the aggregate production and manufacture of iron and steel, in 1860, up to \$285,879,510. The revenue tax paid on iron and steel manufactures in 1864 indicates that the product of the branches taxed amounted to about \$123,000,000. This estimate was far below the production, as many branches were not taxed, and the returns of that year were imperfect. The production and manufacture of 1865 were not less than 400 millions of dollars. There is every reason to expect that the development of the iron mines will be pushed forward with constantly increasing energy, and that the time is not far distant when many of the great repositories of ores we have described—now almost untouched—will be the seats of an active industry and centres of a thriving population, supported by the home markets they will create. The great valley of the west, when filled with the population it is capable of supporting, and intersected in every direction with the vast system of railroads, of which the present lines form but the mere outlines, will itself require more iron than the world now produces, and the transportation of large portions of this from the great iron regions of northern Michigan and Wisconsin, and of

Iron blooms, valued at.....	\$2,623,178
Pig iron.....	20,870,120
Bar, sheet and railroad iron..	31,883,705

coal back to the mines, will sustain larger lines of transportation than have ever yet been employed in conveying to their markets the most important products of the country. The importation of foreign iron—already falling off in proportion to the increased consumption—must, before many years, cease, and be succeeded by exports for the supplies of other nations less bountifully provided for in this respect than the United States and Great Britain.

CHAPTER II.

COPPER.

THE early attempts to work copper mines in the United States have already been alluded to in the introductory remarks to the department of this work relating to mining industry. The ores of this metal are widely distributed throughout the country, and in almost every one of the states have been found in quantities that encouraged their exploration—in the great majority of cases to the loss of those interested. The metal is met with in all the New England states, but only those localities need be named which have at times been looked upon as important.

Copper occurs in a native or metallic state, and also in a variety of ores, or combinations of the metal with other substances. In these forms the metallic appearance is lost, and the metal is obtained by different metallurgical operations, an account of some of which will be presented in the course of this chapter. Until the discovery of the Lake Superior mines, native copper, from its scarcity, was regarded rather as a curiosity than as an important source of supply. The workable ores were chiefly pyritous copper, vitreous copper, variegated copper, the red oxide, the green carbonate or malachite, and chrysocolla. The first named, though containing the least proportion of copper, has furnished more of the metal than all the other ores together, and is the chief dependence of most of the mines. It is a double sulphuret of copper and iron, of bright yellow color, and consists, when pure, of about 34 per cent. of copper, 35 of sulphur, and 30 of iron. But the ore is always intermixed with quartz or other earthy minerals, by which its richness is greatly reduced. As brought out from the mine it may not contain more than 1 per cent. of copper, and when freed as far as practicable from foreign

substances by the mechanical processes of assorting, crushing, washing, jigging, etc., and brought up to a percentage of 6 or 7 of copper, it is in Cornwall a merchantable ore, and the mine producing in large quantity the poor material from which it is obtained may be a profitable one. Vitreous copper, known also as copper glance, and sulphuret of copper, is a lead gray ore, very soft, and contains 79.8 per cent. of copper, united with 20.2 per cent. of sulphur. It is not often found in large quantity. Variegated or purple copper is distinguished by its various shades of color and brittle texture. It yields, when pure, from 56 to 63 per cent. of copper, 21 to 28 of sulphur, and 7 to 14 of iron. The red oxide is a beautiful ore of ruby red color, and consists of 88.8 per cent. of copper and 11.2 per cent. of oxygen. It is rarely found in sufficient quantity to add much to the products of the mines. Green malachite is a highly ornamental stone, of richly variegated shades of green, famous as the material of costly vases, tables, etc., manufactured in Siberia for the Russian government. It is always met with in copper mines, especially near the surface, but rarely in large or handsome masses. It consists of copper 57.5, oxygen 14.4, carbonic acid 19.9, and water 8.2 per cent. Chrysocolla is a combination of oxide of copper and silica, of greenish shades, and is met with as an incrustation upon other copper ores. It often closely resembles the malachite in appearance. It contains about 36 per cent. of copper.

The first mines worked in the United States were peculiar for the rich character of their ores. These were, in great part, vitreous and variegated copper, with some malachite, and were found in beds, strings, and bunches in the red sandstone formation, especially along its line of contact with the gneiss and granitic rocks in Connecticut, and with the trap rocks in New Jersey. The mine at Simsbury, in Connecticut, furnished a considerable amount of such ores from the year 1709 till it was purchased, about the middle of the last century, by the state, from which time it was occupied for sixty years as a prison, and worked by the convicts; not, however, to much profit. In 1830 it came into possession of a company, but was only worked for a short time afterward. On the same geological range, but lying chiefly in the gneiss rocks, the most productive of these mines was opened in

1836, in Bristol, Conn. It was vigorously worked from 1847 to 1857, and produced larger amounts of rich vitreous and pyritous ores than have been obtained from any other mine in the United States. No expense was spared in prosecuting the mining, and in furnishing efficient machinery for dressing the ores. Although 1800 tons of ore, producing over \$200,000, were sent to market, the ore yielding from 18 to 50 per cent. of copper, the mine proved a losing affair, and was finally abandoned in 1857.

The New Jersey mines have all failed, from insufficient supply of the ores. The Schuyler mine, at Belleville, produced rich vitreous copper and chrysocolla, disseminated through a stratum of light brown sandstone, of 20 to 30 feet in thickness, and dipping at an angle of 12°. During the periods of its being worked in the last century, the excavations reached the depth of 200 feet, and were carried to great distances on the course of the metalliferous stratum. The mine was then so highly valued that an offer of £500,000, made for it by an English company, was refused by the proprietor, Mr. Schuyler. In 1857-58 attempts were made by a New York company to work the mine again, but the enterprise soon failed. Among the other mines which have been worked to considerable extent in New Jersey are the Flemington mine, which resembled in the character of its ore the Schuyler mine, and the Bridgewater mine, near Somerville, at which native copper in some quantity was found in the last century; two pieces met with in 1754 weighing together, it was reported, 1,900 lbs. A mine near New Brunswick also furnished many lumps of native copper, and thin sheets of the metal were found included in the sandstone. At different times this mine has been thoroughly explored, to the loss of those engaged in the enterprise. In Somerset county, the Franklin mine, near Griggstown, has been worked to the depth of 100 feet. Carbonate and red oxide of copper were found in the shales near the trap, but not in quantity sufficient to pay expenses. In Pennsylvania, near the Schuylkill river, in Montgomery and Chester counties, many mines have been worked for copper and lead at the junction of the red sandstone and gneiss. Those veins included wholly in the shales of the red sandstone group were found to produce copper chiefly, while those in the gneiss were productive in lead ores. At the Perkiomen and Ecton mines—both upon the same lode

—extensive mining operations have been carried on; a shaft upon the latter having reached in 1853 the depth of 396 feet. The sales of copper ores during the three years the mines were actively worked amounted to over \$40,500; but the product was not sufficient to meet the expenditures.

The mines in Frederick county, Maryland, in the neighborhood of Liberty, were near the red sandstone formation, though included in argillaceous and talcose slates. A number of them have been worked at different times up to the year 1853, when they were finally given up as unprofitable.

A more newly discovered and richer copper district in Maryland is near Sykesville, on the Baltimore and Ohio railroad, 32 miles from Baltimore, in a region of micaceous, talcose, and chloritic slates. A large bed of specular iron ore lying between the slates was found to contain, at some depth below the surface, carbonates and silicates of copper, and still further down copper pyrites. In the twelve months preceding April 1, 1857, 300 tons had been mined and sent to market, the value of which was \$17,896.92, and the mine was reported as improving. The ore sent to the smelting works at Baltimore, in December of that year, yielded 16.03 per cent. of copper. Within seven miles of Baltimore the Bare Hill mine has produced considerable copper, associated with the chromic iron of that region.

Like the last two named, all the other localities of copper ores of any importance along the Appalachian chain and east of it are remote from the range of the red sandstone, and belong to older rock formations. In the granites of New Hampshire, pyritous copper has been found in many places, but has nowhere been mined to any extent. In Vermont, mining operations were carried on for several years upon a large lode of pyritous copper, which was traced several miles through Vershire and Corinth. At Strafford, pyritous ores were worked in 1829 and afterward, both for copperas and copper. In New York, excellent pyritous ores were produced at the Ulster lead mine in 1853. Among other sales of similar qualities of ore, one lot of 50 tons produced 24.3 per cent. of copper.

In Virginia, rich ores of red oxide of copper, associated with native copper and pyritous copper, are found in the metamorphic slates at Manasses Gap, and also in many other places further south along the Blue

Ridge. The very promising appearance of the ores, and their numerous localities, would encourage one to believe that this will prove to be a copper region, were it not that, when explored, the ores do not seem to lie in any regular form of vein. In the southern part of the state, in Carroll, Floyd, and Grayson counties, copper was discovered in 1852, and mines were soon after opened in a district of metamorphic slates, near their junction with the lower silurian limestones. The copper was met with in the form of pyritous ore, red oxide, and black copper, beneath large outcropping masses of hematite iron ore, or gossan. Some of the shipments are said to have yielded over 20 per cent. of copper. The amount of ores sent east, over the Virginia and Tennessee railroad, in 1855, was 1,931,403 lbs.; in 1856, 1,972,834 lbs.; and in the nine months ending June 30, 1857, 1,085,997 lbs.; 1858, 688,418 lbs.; 1859, 1,151,132 lbs.; and 1860, 2,679,673 lbs. Copper ores are very generally met with in the gold mines of this state, and further south, but the only one of them that has been worked expressly for copper is that of the North Carolina Copper Company, in Guilford county. From this a considerable amount of pyritous copper ores were sent to the north in 1852 and 1853.

In Tennessee, an important copper region lies along the southern line of Polk county, and extends into Gilmer county, Georgia. The ore was first found in 1847, associated with masses of hematite iron ores, which formed great outcropping ledges, traceable for miles from south-west to north-east along the range of the micaceous and talcose slates. An examination of the ores, made to ascertain the cause of their working badly in the furnace, was the means of corroborating or giving importance to the discovery of the copper. In 1851 copper mining was commenced, and afterward prosecuted with great activity by a number of companies. The ore was found in seven or eight parallel lodes of the ferruginous matters, all within a belt of a mile in width. At the surface there was no appearance of it, but as the explorations reached the depth of seventy-five or one hundred feet below the surface of the hills, it was met with in various forms, resulting from the decomposition of pyritous copper, and much mixed with the ochreous matters derived from a similar source. In a soft black mass, easily worked by the pick, and of extraordinary dimensions, were found

intermixed different oxides and other ores of copper, yielding various proportions of metal, and much of it producing 20 per cent. and more, fit to be barrelled up at once for transportation. This ore spread out in a sheet, varying in width at the different mines; at the Eureka mine it was 50 feet wide, and at the Hiwassee 45 feet, while at the Isabella mine the excavations have been extended between two walls 250 feet apart. In depth this ore is limited to a few feet only, except as it forms bunches running up into the gossan or ochreous ores. Below the black ore is the undecomposed lode, consisting of quartz, more or less charged with pyritous copper, red oxide, green carbonate, and gray sulphuret of copper; and it is upon these the permanent success of the mines must depend. About 14 mining companies have been engaged in this district, and the production of the most successful of them was as follows, up to the year 1858: Isabella, 2,500 tons; Calloway, 200; Mary's, 1,500; Polk county, 2,100; Tennessee, 2,200; Hiwassee, 2,500; Hancock, 2,000—making a total of 13,000 tons, yielding from 15 to 40 per cent. of copper, and worth \$100 per ton, or \$1,300,000. In addition to this, the products of the London mine, yielding an average of 45 per cent. of copper, amounted to over \$200,000 in value; and the products of the Eureka mine were rated for 1855 at \$86,000; for 1856 at \$123,000; and for 1857 at \$136,000. The value of the ores remaining at the mines too poor to transport, but valuable to smelt in furnaces on the spot, was estimated at \$200,000 more. Furnaces for smelting, on the German plan, were in operation in 1857, and produced the next year 850 tons of matt, or regulus. At the Eureka mine, in 1858, there were 4 reverberatory furnaces, 2 blast, and 2 calcining furnaces. The fuel employed is wood and charcoal. By the introduction of smelting operations, ores of 5 to 6 per cent. are now advantageously reduced.

In 1857 the mines of a large portion of this district were incorporated into the so-called Union Consolidated Mining Company, and most of the other mines were taken up by the Burra Burra Company and the Polk County Company. The principal interests in the last two are held in New Orleans. The first named own 11 mines, of which they are working three only, with a monthly production of 750 to 800 tons of 12 per cent. copper, besides 5 or 6 tons of precipitate

copper. This is metallic copper, precipitated from the waters of the mine by means of scrap iron thrown into the vats in which these waters are collected. The iron being taken up by the acids which hold the copper in solution, the latter is set free, and deposited in fine metallic powder. The ore is smelted in furnaces constructed on the German plan, and being put through twice, produce a regulus of 55 per cent. As soon as the proper furnaces and refineries can be constructed, it is intended to make ingot copper, and by working more of the mines belonging to the company it is expected the monthly production will soon be raised to 2,000 tons of 10 to 12 per cent. ore.

The two other companies have erected extensive smelting works; and the mines of the Burra Burra are producing 450 to 500 tons per month of 14 per cent. ore, and those of the Polk County Company about 300 tons of 15 per cent. ore. Both companies will soon be able to make ingot copper. The report of the Union Consolidated Company for the first year of their operations presents, against expenditures amounting to \$307,182.77, receipts of \$457,803.73, leaving a profit of \$150,620.96. A large portion of the regulus is shipped to England for sale.

The profits of these mines were greatly reduced the first few years of their operation by the necessity of transporting the ores 40 miles to a railroad, and thence more than 1,000 miles by land and water to the northern smelting works. The establishment of furnaces at the mines not only reduces this source of loss, but renders the great body of poorer ores available, which they were not before. A railroad is now in process of construction to connect the mines with the Georgia railroads.

West of the Alleghanies, the only copper mines, besides those of Lake Superior, are in the lead region of Wisconsin, Iowa, and Missouri. A considerable number of them have been worked to limited extent, and small blast furnaces have been in operation smelting the ores. These were found only near the surface, in the crevices that contained the lead ores; and in Missouri, in horizontal beds in the limestone, along the line of contact of the granite. The ores were mixed pyritous copper and carbonate, always in very limited quantity. The amount of copper produced has been unimportant, and it is not likely that any considerable in-

crease in the supply of the metal will be derived from this source.

The existence of native copper on the shores of Lake Superior, is noticed in the reports of the Jesuit missionaries of 1659 and 1666. Pieces of the metal 10 to 20 lbs. in weight were seen, which it is said the Indians revered as sacred; similar reports were brought by Father Dablou in 1670, and by Charlevoix in 1744. An attempt was made in 1771 by an Englishman, named Alexander Henry, to open a mine near the forks of the Ontonagon, on the bank of the river, where a large mass of the metal lay exposed. He had visited the region in 1763, and returned with a party prepared for more thoroughly exploring its resources. They, however, found no more copper besides the loose mass, which they were unable to remove. They then went over to the north shore of the lake, but met with no better success there. General Cass and Mr. H. R. Schoolcraft visited the region in 1819, and reported on the great mass upon the Ontonagon. Major Long, also, in 1823, bore witness to the occurrence of the metal along the shores of the lake. The country, till the ratification of the treaty with the Chipewewa Indians in 1842, was scarcely ever visited except by hunters and fur-traders, and was only accessible by a tedious voyage in canoes from Mackinaw. The fur companies discouraged, and could exclude from the territory, all explorers not going there under their auspices. Dr. Douglass Houghton, the state geologist of Michigan, in the territory of which these Indian lands were included, made the first scientific examination of the country in 1841, and his reports first drew public attention to its great resources in copper. His explorations were continued both under the state and general government until they were suddenly terminated with his life by the unfortunate swamping of his boat in the lake, near Eagle river, October 13, 1845.

In 1844 adventurers from the eastern states began to pour into the country, and mining operations were commenced at various places near the shore, on Keweenaw Point. The companies took possession under permits from the general land office, in anticipation of the regular surveys, when the tracts could be properly designated for sale. Nearly one thousand tracts, of one mile square each, were selected—the greater part of them at random, and afterward explored and aban-

done. In 1846 a geological survey of the region was authorized by Congress, which was commenced under Dr. C. T. Jackson, and completed by Messrs. Foster and Whitney in 1850. At this time many mines were in full operation, and titles to them had been acquired at the government sales.

The copper region, as indicated by Dr. Houghton, was found to be nearly limited to the range of trap hills, which are traced from the termination of Keweenaw Point toward the south-west in a belt of not more than two miles in width, gradually receding from the lake shore. The upper portion of the hills is of trap rock, lying in beds which dip toward the lake, and pass in this direction under others of sandstone, the outcrop of which is along the northern flanks of the hills. Isle Royale, near the north shore of the lake, is made up of similar formations, which dip toward the south. These rocks thus appear to form the basin in which the portion of Lake Superior lying between is held. The trap hills are traced from Keweenaw Point in two or three parallel ridges of 500 to 1,000 feet elevation, crossing Portage lake not far from the shore of Lake Superior, and the Ontonagon river about 13 miles from its mouth. They thence reach further back into the country beyond Agogebic lake, full 120 miles from the north-eastern termination. Another group of trap hills, known as the Porcupine mountains, comes out to the lake shore some 20 miles above the mouth of the Ontonagon, and this also contains veins of copper, which have been little developed until the explorations commenced near Carp lake in these mountains in 1859. These have resulted in a shipment of over 20 tons of rough copper in 1860, and give encouragement to this proving a copper-producing district. The formations upon Isle Royale, which is within the boundary of the United States, although they are similar to those of the south shore, and contain copper veins upon which explorations were vigorously prosecuted, have not proved of importance, and no mines are now worked there. The productive mines are comprised in three districts along the main range of the trap hills. The first is on Keweenaw Point, the second about Portage lake, and the third near the Ontonagon river. All the veins are remarkable for producing native copper alone, the only ores of the metal being chiefly of vitreous copper found in a range of hills on the south side of Keweenaw Point,

and nowhere in quantities to justify the continuation of mining operations that were commenced upon them. The veins on Keweenaw Point cross the ridges nearly at right angles, penetrating almost vertically through the trap and the sandstones. Their productiveness is, for the most part, limited to certain amygdaloidal belts of the trap, which alternate with other unproductive beds of gray compact trap, and the mining explorations follow the former down their slope of 40°, more or less, toward the north. The thickness of the veins is very variable, and also their richness, even in the amygdaloid. The copper is found interspersed in pieces of all sizes through the quartz vein stones and among the calcareous spar, laumontite, prehnite, and other minerals associated with the quartz. These being extracted, piles are made of the poorer sorts, in which the metal is not sufficiently clear of stone for shipment, and these are roasted by firing the wood intermixed through the heaps. By this process the stone entangled among the copper is more readily broken and removed. The lumps that will go into barrels are called "barrel work," and are packed in this way for shipment. Larger ones, called "masses," some of which are huge, irregular-shaped blocks of clean copper, are cut into pieces that can be conveniently transported, as of one to three tons weight each. This is done by means of a long chisel with a bit three-fourths of an inch wide, which is held by one man and struck in turns by two others with a hammer weighing 7 or 8 lbs. A groove is thus cut across the narrowest part of the mass, turning out long chips of copper one-fourth of an inch thick; and with each succeeding cut the groove is deepened to the same extent until it reaches through the mass. The process is slow and tedious, a single cut sometimes occupying the continual labor of three men for as many weeks, or even longer. This work is done in great part before the masses can be got out of the mine. The masses are found in working the vein, often occupying the whole space between the walls of trap rock, standing upon their edges, and shut in as solidly as if all were one material. To remove one of the very large masses is a work of many months. It is first laid bare along one side by extending the level or drift of the mine through the trap rock. The excavation is carried high enough to expose its upper edge and down to its lower line; but on account of ir-

regular shape and projecting arms of copper, which often stretch forward, and up and down, connecting with other masses, it requires long and tedious mining operations to determine its dimensions. When it is supposed to be nearly freed along one side, very heavy charges of powder are introduced in the rock behind the mass, with the view of starting it from its bed. When cracks are produced by these, heavier charges are introduced in the form of sand-blasts, and these are repeated until the mass is thrown partly over on its side as well as the space excavated will admit. In speaking further of the Minnesota mine, the enormous sizes of some of the masses, and the amount of powder consumed in loosening them, will be more particularly noticed.

To separate the finer particles of copper from the stones in which they are contained, these, after being roasted, are crushed under heavy stamps to the condition of fine sand, and this is then washed after the usual method of washing fine ores, until the earthy matters are removed and the metallic particles are left behind. This is shovelled into small casks for shipment, and is known as stamp copper. The stamping and crushing machinery, such as have long been used at the mining establishments of other countries, were found to be entirely too slow for the requirements of these mines, and they have been replaced by new apparatus of American contrivance, which is far more efficient than any thing of the kind ever before applied to such operations. The stamps heretofore in use have been of 100 lbs. to 300 lbs. weight, and at the California mines were first introduced of 800 lbs. to 1,000 lbs. weight. At Lake Superior they are in use on the plan of the steam hammer, weighing, with the rod or stamp-leg, 2,500 lbs. and making 90 to 100 strokes in a minute. The capacity of each stamp is to crush over one ton of hard trap rock every hour. It falls upon a large mortar that rests upon springs of vulcanized rubber, and the force of its fall is increased by the pressure of steam applied above the piston to throw it more suddenly down. The stamp-head covers about one-fourth of the face of the mortar, and with every succeeding stroke it moves to the adjoining quarter, covering the whole face in four strokes.

The only other metal found with the copper is silver, and this does not occur as an alloy, but the two are as if welded together, and neither, when assayed, gives more than

a trace of the other. It is evident from this that they cannot have been in a fused state in contact. The quantity of silver is small; the largest piece ever found weighing a little more than 8 lbs. troy. This was met with at the mines near the mouth of Eagle river, where a considerable number of loose pieces, together with loose masses of copper, were obtained in exploring deep under the bed of the stream an ancient deposit of rounded boulders of sandstone and trap. The veins of even the trap rocks themselves of this locality exhibited so much silver that in the early operations of the mines a very high value was set upon them on this account. But at none of the Lake Superior mines has the silver collected paid the proprietors for the loss it has occasioned by distracting the attention of the miners, and leading them to seek for it with the purpose of appropriating it to their own use. Probably they have carried away much the greater part of this metal; at least until the stamp mills were in operation.

The principal mine of this district is the Cliff mine of the Pittsburgh and Boston Company, opened in 1845, and steadily worked ever since. In 1858 the extent of the horizontal workings on the vein had amounted to 12,368 feet, besides 831 feet in cross-cuts. Five shafts had been sunk, one of which was 817 feet deep, 587 feet being below the adit level, and 230 feet being from this level to the summit of the ridge. The shaft of least depth was sunk 422 feet.

The production of the mine from the year 1853 is exhibited in the following table:—

Year.	Mineral produced. lbs.	Refined copper. lbs.	Yield per cent.	Price per lb. deducting cost of smelting.	Value realized.
1853,	2,263,152	1,071,288	47.33	cts. 27.32	\$292,647 05
1854,	2,332,614	1,315,308	56.35	14.38	320,783 01
1855,	2,995,837	1,874,197	62.56	25.33	475,911 26
1856,	3,291,239	2,220,934	67.48	24.12	535,843 67
1857,	3,363,557	2,363,850	70.28	20.44	497,870 47
1858,	3,183,085	2,331,964	71.00	21.03	475,321 89
1859,	2,139,632	1,415,007	64.35	20.50	290,097 97
1860	2,505,442	..	..	..	..

22,374,588
Product from accu- }
mulated slags... } 71,530, exclusive of slags.

The quantities of the different sorts for the year 1857 are as follows:—

941 masses.....	1,958,181 lbs.
869 bbls. of barrel work.....	613,731 "
1,020 " of stampings.....	791,645 "
Total.....	3,363,557 "

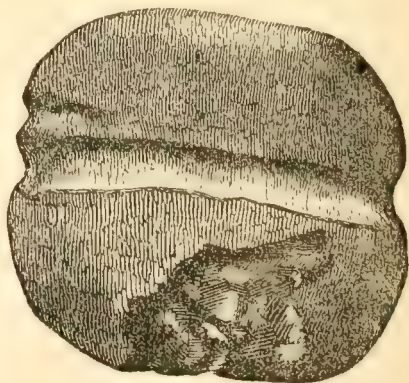
The Portage lake mining district is from twenty to twenty-five miles west from the

Cliff mine on the same range of hills. This region is of more recent development, the explorations having been attended with little success previous to 1854. The veins are here found productive in a gray variety of trap as well as the amygdaloidal, and instead of lying across the ridges, follow the same course with them, and dip in general with the slope of the strata. Some of the larger veins consist in great part of epidote, and the copper in these is much less dense than in the quartz veins, forming tangled masses which are rarely of any considerable size. On the eastern side of this lake are worked, among other mines, the Quincy, Pewabic, and Franklin, and on the opposite side the Isle Royale, Portage, and Columbian mines. The most successful of these has been the Pewabic. Operations were commenced here in 1855 upon an unimproved tract, requiring the construction of roads and buildings, clearing of land, etc. etc., all involving for several years a continued heavy outlay. The immediate and rapid production of the mine required the construction of costly mills, without which a large proportion of the copper would be unavailable for the market. The first three years the assessments were \$50,000, and the shipments of barrel and mass copper were in 1856 $97\frac{83.6}{20000}$ tons; in 1857, $209\frac{32.9}{20000}$ tons; in 1858, 402 tons; in 1859, $813\frac{77.8}{20000}$ tons. The proceeds from the sales up to this time paid off all the expenditures, and left besides a considerable surplus. The Franklin Company, working the same lode upon the adjoining location, commenced operations in July, 1857, and that year shipped 20 tons of copper, the next year 110 tons, and in 1859, 218 tons; the total amount in capital furnished by assessments was \$10,000. These two mines have been the most rapidly developed of any of the Lake Superior mines.

The Ontonagon river crosses the trap hills about forty miles south-west from Portage lake, and the mines worked in the Ontonagon district are scattered along the hills north-east from the river for a distance of nearly twenty miles. The outlet for the greater number of them is by a road through the woods to the village at the mouth of the river. The veins of this district also lie along the course of the ridges, and dip with the trap rocks toward the lake. As they are worked, however, they are found occasionally to cut across the strata, and neighboring veins to run into each other. In some

places copper occurs in masses scattered through the trap rock with no sign of a vein, not even a seam or crevice connecting one mass with another. They appear, however, to be ranged on the general course of the strata. At the Adventure mine they were so abundant, that it has been found profitable to collect them, and the cliffs of the trap rock present a curious appearance, studded over with numerous dark cavities in apparently inaccessible places leading into the solid face of the mountain.

The great mine of this district for fifteen years was the Minnesota, two miles east from the Ontonagon river. The explorers in this region in the winter of 1847-48, found parallel lines of trenches, extending along the trap hills, evidently made by man at some distant period. They were so well marked, as to be noticed even under a cover of three feet depth of snow. On examination they proved to be on the course of veins of copper, and the excavations were found to extend down into the solid rock, portions of which were sometimes left standing over the workings. When these pits were afterward explored, there were found in them large quantities of rude hammers, made of the hardest kind of greenstone, from the trap rocks of the neighborhood. These were of all sizes, ranging from four to forty pounds weight, and of the same general shape—one end being rounded off for the end of the hammer, and the other shaped like a wedge. Around the middle was a groove—the large hammers had two—evidently intended for securing the handle by



STONE HAMMER.

which they were wielded. In every instance the hammers were more or less broken, evi-

dently in service. One of them brought from the mine by the writer, and now in the collection of the Cooper Union of New York, is represented in the accompanying sketch. It measures 6½ inches in length, the same in breadth, and 2½ inches in thickness.

The quantity of hammers found in these old workings was so great that they were collected by cart-loads. How they could have been made with such tools as the ancient miners had, is unaccountable, for the stone itself is the hardest material they could find. And it is not any more clear, how they applied such clumsy tools to excavating solid rock nearly as hard as the hammers themselves. Every hammer is broken on the edge, as if worn out in service. The only tools found besides these were a copper gad or wedge, a copper chisel with a socket head, and a wooden bowl. The great extent of the ancient mining operations indicates that the country must have been long occupied by an industrious people, possessed of more mechanical skill than the present race of Indians. They must also have spread over the whole of the copper region, for similar evidences of their occupancy are found about all the copper mines, and even upon Isle Royale. It is not improbable that they belonged to the race of the mound builders of the western states, among the vestiges of whom, found in the mounds, various utensils of copper have been met with. But of the period when they lived, the copper mines afford no more evidence than the mounds. Some of the trenches at the Minnesota mine, originally excavated to the depth of more than twenty-five feet, have since filled up with gravel and rubbish to within a few feet of the surface, a work which in this region would seem to require centuries; and upon the surface of this material large trees are now standing, and stumps of much older ones are seen, that have long been rotting. In clearing out the pits a mass of copper was discovered, buried in the gravel nearly twenty feet below the surface, which the ancients had entirely separated from the vein. They had supported it upon blocks of wood, and, probably by means of fire and their hammers, had removed from it all the adhering stone and projecting points of copper. Under it were quantities of ashes and charred wood. The weight of the mass, after all their attempts to reduce it, appears to have been too great for them to raise; and when it was finally taken out in 1848, it was found to

weigh over six tons. It was about ten feet long, three feet wide, and nearly two feet thick. Beneath this spot the vein afterward proved extremely rich, affording many masses of great size.

The veins worked by the Minnesota Company all lie along the southern slope of the northern trap ridge, not far below the summit. Three veins have been discovered which lie nearly parallel to each other. The lowest one is along the contact of the gray trap of the upper part of the hill and a stratum of conglomerate which underlies this. It dips with the slope of this rock toward the north-north-west at an angle of about 46° with the horizon. The next upper vein outcropping, 80 or 90 feet further up the hill, dips about 61°, and falls into the lower vein along a very irregular line. Both veins are worked, and the greatest yield of the mine has been near their line of meeting.

The position of the veins along the range of the rocks, instead of across them, gives to the mines of this character a great advantage, as their productiveness is not limited to the thickness of any one belt which proves favorable for the occurrence of the metal; and the outcrop of the vein can be traced a great distance along the surface, affording convenient opportunities for sinking directly upon it at any point.

The Minnesota Company, having abundant room, were soon able to sink a large number of shafts along a line of outcrop of 1,800 feet, and several of the levels below extended considerably further than this entire length. In 1858 nine shafts were in operation, and ten levels were driven on the vein, the deepest at 536 feet down the slope. The ten fathom level at that time was 1,960 feet in length. This mine has been remarkable for the large size and great number of its masses. The largest one of these, taken out during the year 1857, after being uncovered along its side, refused to give way, though 1,450 pounds of powder had been exploded behind it in five successive sand-blasts. A charge of 625 pounds being then fired beneath it, the mass was so much loosened that by a succeeding blast of 750 pounds it was torn off from the masses with which it connected, and thrown over in one immense piece. It measured forty-five feet in length, and its greatest thickness was over eight feet. Its weight was estimated at about 500 tons. What it proved to be is not certain, as no account was preserved

of the pieces into which it was cut, but it is known to have exceeded 400 tons. Other masses have been taken out which presented a thickness of over five feet solid copper. The value of the silver picked out from

among the copper has amounted in one year to about \$1,000.

The reports of the company present the following statistics of the mine from its earliest operations:—

Years.	No. of men employed.	Expenditure.	Mineral product. Tons.	Per-centage	Value of Copper.	Assessments paid.	Dividends.
1848,	20	\$14,000	6½	..	\$1,700	\$10,500	..
1849,	60	28,000	52	..	14,000	16,500	..
1850,	90	58,000	103	..	29,000	36,000	..
1851,	175	88,000	307½	..	90,000	3,000	..
1852,	212	108,000	520	..	196,000	..	\$30,000
1853,	280	168,000	523	..	210,000	..	60,000
1854,	392	218,000	763	..	290,000	..	90,000
1855,	471	280,933	1,434	71	549,876	..	200,000
1856,	537	356,541	1,859	72.5	701,906	..	300,000
1857,	615	402,538	2,058	74	736,000	..	300,000
1858,	713	384,827	1,833	70.1	595,000	..	180,000
1859,	718	384,394	1,626	71	515,786	..	120,000
1860,	{ 8 months to Sept. 1..... 1,431		1,431				
	{ Estimate, for the year.... 2,250		2,250				

In consequence of recent discoveries of masses of copper running into the sandstone off from the vein itself, the product of the year 1860 will considerably exceed that of any other year; the profits, however, are not proportionally large, owing to the low price of copper. To this the diminished profits of 1858 and 1859 are partly to be attributed. The product for 1857, 1858, and 1859 was divided as follows:—

Years.	Masses. lbs.	Barrel work. lbs.	Stamp work. lbs.
1857,	3,015,581	819,900	280,512
1858,	2,429,989	903,871	333,352
1859,	2,040,454	929,571	282,092
Districts.	1855.	1856.	1857.
Keweenaw.....	2,245	2,128	2,200
Portage.....	316	462	704
Ontonagon.....	1,984	2,767	3,190
Porcupine, Mo., etc.....	..	..	..
Total.....	4,544	5,357	6,094

Besides the dividends named, the original stockholders have derived large profits from the sale of portions of the extensive territory, three miles square, which belonged to the company, and the organization upon these tracts of new companies.

Before the completion of the St. Mary's Canal, no exact records were preserved of the amount of copper sent from Lake Superior. But up to the close of navigation in 1854 it is supposed the total shipments from the commencement of mining in 1845 had been about 7642 tons of pure copper.

Since that time, the annual product of rough copper has been as follows:—

	1855.	1856.	1857.	1858.	1859.	1860.
Keweenaw.....	2,245	2,128	2,200	2,125	1,910.3	1,910.8
Portage.....	316	462	704	1,116	1,533.1	3,064.8
Ontonagon.....	1,984	2,767	3,190	2,655	2,597.6	3,588.7
Porcupine, Mo., etc.....	..	..	..	..	..	28.1
Total.....	4,544	5,357	6,094	5,896	6,041.0	8,543.4

The condition of the Lake Superior mines at the close of the year 1860 is well presented in the business circular of Messrs. Dupee, Beck, & Sayles, of Boston, received since the preceding pages passed through the hands of the printer and stereotyper. From this we introduce the following additional matter. The depreciation in the price of copper from a maximum of 29½ cents a pound of the few preceding years to a maximum of 24½ cents and a minimum of 19 cents, had induced increased economy and care in the administration of the mines, the good effects of which were already beginning to be experienced:—

“Freights to and from the mines from May to September were 25 per cent. less than in 1859. The transportation of a ton of copper from the lake shore to Boston, cost, after the opening of St. Mary's Canal, 1855, \$20; in 1860, to Boston, \$11, and to New York, \$9. The substitution of bituminous coal for wood, which has been delivered during the past summer at the wharves of Portage Lake for \$3.25 per ton, will save much money and leave the forests of the country for building materials and for timbering of the mines. With the wants of a rapidly increasing population, new and cheaper sources of supply are constantly

opening in the region itself. Many agricultural products, hitherto sent up at great cost from Lower Michigan, are now raised in the neighborhood of the mines, and at the new settlements on the south-western shores of the lake, cheaply and abundantly. At Portage Lake, a machine shop, an iron foundry, and a manufactory of doors, sashes, blinds, etc., have been put in operation during 1860. The smelting works of the Portage Lake Company are now successfully refining the products of that district. These works consist of four reverberatory and two cupola furnaces, capable of refining 6000 tons per annum. The buildings are of the most thorough and substantial character, and the location of the works accessible, at a very small cost of transportation, to all the mines now wrought, or likely to be wrought for many years hence, in that neighborhood. Hitherto, to save cost of transportation to the smelting companies in other states, it has been necessary to dress the rough copper to an average probably of 70 per cent. Now, by the proximity of the furnaces to the mines, a dressing of 50 per cent. will answer the same purpose, while the refined copper, hitherto rarely ready for the market before the 1st to 15th July, will be sent directly from the lake to New York or Boston, arriving there in ordinary seasons by the 1st of June. Further, there will be added the new facility of obtaining cash advances through the winter on the warehouse receipts of the smelting company.

"The opening of the entry into Portage Lake during the past season has been one of the greatest improvements in the navigation of the Lake Superior region since the completion of the ship canal around the falls of St. Mary's river. At the comparatively small cost of \$50,000, steamers of the largest class able to pass through the St. Mary's Canal may now enter Portage Lake, and discharge their cargoes at the docks of the several companies located on its shores. Besides avoiding the loss of time and expense of transshipment hitherto necessary, the opening of Portage Lake has provided one of the most capacious and safest harbors in the world.

"In the Ontonagon district, a plank road has been completed recently, facilitating to a very great extent the transportation to and from the Minesota, National, Rockland, and Superior mines.

"The iron interests of Lake Superior are rapidly attaining great importance. The

amount brought down to Marquette, the port of shipment, in 1860, was: of iron ore from the Jackson Company, 62,980 tons; Cleveland Company, 47,889; Lake Superior Company, 39,394; total, 150,263. Of pig iron, Pioneer Company, 3050 tons; S. R. Gay, 1800; Northern Company, 650; total, 6500. Ore valued at \$3; pig at \$25; aggregate value, \$588,289."

The following statistics are presented of the principal mines:—

COMPARATIVE TABLE OF SHIPMENTS OF ROUGH COPPER FROM LAKE SUPERIOR DURING THE SEASONS OF 1859 AND 1860.

The weights of the barrels have been deducted, and the results are given in tons (2000 lbs.) and tenths.

KEWEENAW DISTRICT.		
	1859.	1860.
Central.....	172.3	78.6
Clark.....	5.6	7.2
Connecticut.....	24.	5.3
Copper Falls.....	329.4	328.
Eagle River.....	6.	..
North American.....	8.7	..
Northwest.....	73.8	103.5
Phoenix.....	32.	31.2
Pittsburg and Boston.....	1,254.5	1,357.
Summit.....	4.	..
	1,910.3	1,910.8
PORTAGE DISTRICT.		
C. C. Douglass.....	..	24.
Isle Royale.....	241.3	458.6
Franklin.....	204.7	267.
Hancock.....	..	7.2
Huron.....	7.4	73.
Mesnard.....	.6	..
Pewabic.....	734.4	1,363.8
Portage.....	8.7	..
Quincy.....	336.	866.2
	1,533.1	3,064.8
ONTONAGON DISTRICT.		
Adventure.....	139.4	29.7
Aztec.....	15.3	4.9
Bohemian.....	3.	..
Evergreen Bluff.....	27.	41.9
Hamilton.....	.7	7.9
Mass.....	12.3	..
Minesota.....	1,623.6	2,183.4
National.....	323.2	727.8
Nebraska.....	9.8	26.4
Norwich.....	22.	..
Ogima.....	35.4	..
Ridge.....	27.8	..
Rockland.....	347.	552.7
Superior.....	1.7	14.
Toltec.....	9.4	..
	2,597.6	3,588.7
Keweenaw District.....	1,910.3	1,910.8
Portage.....	1,533.1	3,050.8
Ontonagon.....	2,597.6	3,563.7
Porcupine Mountain.....	..	20.5
Sundry mines.....	..	7.6
	6,041.0	8,543.4

Franklin: the product for the year ending November 30 has been 112 masses, weighing 72,166 lbs.; 721 barrels of barrel work, 469,116 lbs.; and 67 barrels stamp work, 63,816 lbs. Total, 605,098 lbs., equal to $180\frac{7}{8}$ tons refined copper. The actual shipments were about 267 tons rough, or 158 tons ingot copper. The stamps are Ball's, consisting of two pairs of two heads each. They did not commence work till November 19.

Huron: total shipments this year, $65\frac{3}{10}$ tons of $64\frac{1}{2}$ per cent. barrel work, and 12,311 lbs. of refined copper, smelted at the Portage Lake works. There is ready for the stamps an amount equivalent, at a fair estimate, to the quantity shipped this season.

Isle Royale: total shipments this season $458\frac{8}{10}$ tons, averaging over 70 per cent. Preparations have been made for opening a large amount of ground during the winter, with a view to large shipments at the opening of navigation.

Minnesota: November returns, 150 tons. The total shipments in 1860 were 1992 masses, and 2127 barrels of barrel and stamp work. Net weight, 4,366,718 lbs. This is the largest shipment made in one year by any mine at the lake. The promise for future production is as great, at least, as the result for this year.

Pewabic: November product, $304\frac{8}{10}$ tons. The actual shipments for the season have been 2,727,632 lbs. The product for one year to November 30 was as follows: 467 masses, weighing 348,658 lbs.; 2294 barrels kiln or barrel work, weighing net, 1,450,778 lbs.; 342 barrels No. 1, stamp, 379,718 lbs.; 399 barrels No. 2, stamp, 389,973 lbs.; 401 barrels No. 3, stamp, 346,912 lbs.; add on tributers' account, 27,428. Total, 2,943,467 lbs.

The smelting returns are not yet all made, but on an estimate based on past experience, the result will not vary much from 2,030,992 lbs., or about 1000 tons of ingot copper.

During the year there have been shipped 1533 ounces of silver.

Pittsburg and Boston: November product, 114 tons. Total shipments, 1357 tons. Total product for the year, 1402 tons. The annual report recently published gives the result of the year ending December 1, 1859. The product for that year was $1,099\frac{8}{10}$ tons, yielding $64\frac{3}{10}$ per cent., or $707\frac{3}{10}$ tons in-

got copper. The receipts, including \$2,405 17 from sales of silver, were \$292,503 14. The expenditures were \$272,175 75, leaving net profit, \$20,327 39.

COPPER SMELTING

The ores of copper, unlike those of most of the other metals, are not in general reduced at the mines; but after being concentrated by mechanical processes called dressing—which consist in assorting the piles according to their qualities, and crushing, jigging, and otherwise washing the poorer sorts—they are sold to the smelters, whose establishments may be at great distances off, even on the other side of the globe. The richer ores, worth per ton three or four times as many dollars as the figures that represent their percentage of metal, well repay the cost of transportation, and are conveniently reduced at smelting works situated on the coast near the markets for copper, and where the fuel required for their reduction is cheap. At Swansea, in South Wales, there are eight great smelting establishments, to which all the ores from Cornwall and Devon are carried, and which receive other ores from almost all parts of the world. It is stated that in this district there are nearly 600 furnaces employed, which consume about 500,000 tons of coal per annum, and give employment to about 4,000 persons besides colliers. The amount of copper they supply is more than half of that consumed by all nations. The total product of fine copper produced by all the smelting establishments of Great Britain for 1857 is stated to be 18,238 tons, worth £2,079,323.

The copper smelting works of the United States are those upon the coast, depending chiefly upon foreign supplies of ores, and those of the interior for melting and refining the Lake Superior copper. There are also the furnaces at the Tennessee mines, which have been already noticed. The former are situated at the following localities: At Point Shirley, in Boston harbor, are the furnaces of the Revere Copper Company, which also has rolling mills and other works connected with the manufacture of copper at Canton, on the Boston and Providence railroad. At Taunton, Mass., a similar establishment to that at Canton is owned by the Messrs. Crocker, of that town. There are smelting furnaces at New Haven, Conn.; at Bergen Point, in New York harbor; and at Baltimore, on a point in the outer harbor.

The furnaces established for working the Lake Superior copper are at Detroit, Cleveland, and Pittsburg. At the last named are two separate establishments, with each of which is connected a rolling mill, at which the ingot copper is converted into sheets for home consumption and the eastern market. A furnace was also built at Portage lake, Lake Superior, in 1860, of capacity equal to melting 6000 tons of copper annually. The details and extent of the operations carried on by the smelting works appear to have been carefully kept from publication. In a work on "Copper and Copper Smelting," by A. Snowdon Piggott, M. D., who had charge of the chemical assays, etc., for the Baltimore Company, published in 1858, while the English processes are fully described, no information is given as to the methods adopted at the American works; and of their production all the information is contained in the two closing sentences of the appendix, as follows: "Of the copper-smelting establishments of the United States I have no statistics. Baltimore turns out about 8,000,000 pounds of refined copper annually." Applications which have been made by the writer to the proprietors of several of the establishments for information as to the business, have been entirely unsuccessful. The total production of copper in 1858 was supposed to be about 13,000 tons per annum; and of this about 7000 tons were required by the rolling mills for making sheet copper, sheet brass, and yellow metal.

The French treatise on Metallurgy by Professor Rivot contains the only published description of the American method of smelting copper. By the English process, the separation of the metal from its ores is a long and tedious series of alternate roastings or calcinations, and fusions in reverberatory furnaces. The system is particularly applicable to the treatment of poor, sulphurous ores contaminated with other metals, as iron, arsenic, etc., and can only be conducted to advantage where fuel is very cheap, the consumption of this being at the rate of about 20 tons to the ton of copper obtained. The process employed in Germany is much more simple, and the methods in use at the American smelting works are more upon the plan of these. Blast or cupola furnaces supply at some of them the place of reverberatories, and the separation of the metal is completed in great part by

one or two smeltings. The treatment of the Lake Superior copper is comparatively an easy operation. For this large reverberatory furnaces are employed, through the roof of which is an opening large enough to admit masses of 3 to 3½ tons weight, which are raised by cranes and lowered into the furnace. The barrels of barrel work are introduced in the same way, and left in the furnace without unpacking. When the furnace is charged, the opening in the top is securely closed by fire-proof masonry, and the fire of bituminous coal is started, the flame from which plays over the bridge, and, reflected from the roof, strikes upon the copper, causing it gradually to sink down and at last flow in a liquid mass. A small portion of the copper by the oxidizing action of the heated gases is converted into a suboxide, which is partially reduced again, and in part goes into the slags in the condition of a silicate of copper, the metal of which is not entirely recovered. The mixture of quartz, calcareous spar, and epidote accompanying the copper, is sometimes such as to melt and form a good cinder without addition of any other substance, but usually some limestone or other suitable material is added as a flux. Complete fusion is effected in 12 to 15 hours according to the size of the masses, and this is kept up for about an hour in order that the fine particles of copper may find their way through the fluid slag, which floats upon the metal. Working tools called rabblers are then introduced through the side-doors of the furnace, and the charge is stirred up and the slag is drawn out through the door. It falls upon the ground, and is taken when sufficiently cool to the cupola or slag furnaces where it is chilled with water to render it easy to break up. Those portions which contain as much as one fourth per cent. of copper are reserved to be passed through the slag furnace. The total amount of slag is usually less than 20 per cent. of the whole charge. In the melting the copper absorbs carbon, which if allowed to remain would render it brittle and unfit for use. To remove it the fire is so arranged that the gases pass through with much unconsumed air; this playing on the surface of the copper produces a suboxide of the metal, which in the course of half an hour is quite taken up by the copper, and coming in contact with the particles of carbon the oxygen combines with this, and removes it in the form of carbonic acid gas.

It now remains to remove the excess of oxygen introduced, which is effected by the ordinary method of refining. A large proportion of fuel is employed on the grate for the amount of air admitted through it, so that the flames as they pass over the bridge convey little free oxygen, and the surface of the metal is covered with fine charcoal. After a little time a pole of green wood is thrust into the melted copper and stirred about so long as gases escape from the surface. It is then taken out, and if on testing the copper some suboxide still remains, the refining is cautiously continued with charcoal, and just when, as appears by the tests, all the oxide is reduced, the work of dipping out the metal is commenced. This is done by large iron ladles, the whole set of men employed at two furnaces, to the number of about 12, coming to this work and taking turns in the severe task. They protect themselves from the intense heat by wet cloths about their arms, and as quickly as possible bale out a ladle full of copper and empty it into one or more of the ingot moulds, of which 36 are arranged in front of the furnace-door upon three parallel bars over a trough of water. As the metal becomes solid in each mould, this is upset, letting the ingot fall into the water. The weight of the ingot being 20 pounds, the filling of them all removes 720 pounds of copper from the furnace. The metal that remains is then tested, and according to its condition the discharging may be continued or it may be necessary to oxidize the copper again and repeat the refining, or merely to throw more charcoal upon the surface and increase the heat. The time required to ladle out the whole charge is from four to six hours. When this is completed the sole of the furnace is repaired, by stopping the cracks with sand and smoothing the surface to get all ready for the next charge; and at the same time the second furnace has reached the refining stage of the process. One charge to a furnace is made every evening, and as in the night it is necessary only to keep up the fires, the great labor of the process comes wholly in the day time.

The following is the estimated cost at Detroit of the smelting, on a basis of two furnaces, each of which is charged with four and a half to five tons of mass copper, consuming two and a half tons of coal, and producing from three to three and a half tons of ingots:—

Labor, 15 hands, at \$1.50.....	\$22.50
Bituminous coal, 5 tons, at \$5.....	25.00
Wood and charcoal.....	1.25
Repairs to furnace, average for the season..	2.00
	\$50.75

To this should be added, for superintendence, office, and general expenses, perhaps ten dollars more, which would make the cost for six or seven tons of ingot copper, \$60.75, or \$9 to \$10 per ton. At Pittsburg the rate charged has been \$11 per ton; and fuel is there afforded at about one third the amount allowed in the above estimate.

The cupola furnaces for treating the slags are of very simple plan and construction. They are of cylindrical form, about ten feet high, and three feet diameter inside. Their walls, the thickness of a single length of fire brick, are incased in boiler-plate iron, and stand upon a cast-iron ring, which is itself supported upon four cast-iron columns about three feet above the ground. Transverse iron bars support a circular plate, and upon this the refractory sand for the sole of the furnace is placed, and well beaten down to the thickness of a foot, with a sharp slope toward the tapping hole. A low chimney conveys away the gaseous products of combustion, and through the base of it the workmen introduce the charges. The blast is introduced by three tuyeres a foot above the sole; but before it enters the furnace it is heated by passing through a channel around the furnace. A steady current is obtained by the use of three double acting blowing cylinders, which give a pressure equal to about three and a half inches of mercury.

The hands employed at the Detroit establishment, besides the superintendent and head smelter, are eighteen furnace men and from five to ten workmen, according to the arrivals of copper during the season of navigation. After the stock thus received is worked up, the furnaces remain idle during the remainder of the winter.

USEFUL APPLICATIONS OF COPPER.

The uses of copper are so numerous and important that the metal must rank next in value to iron. In ancient times, indeed, it was the more useful metal of the two, being abundant among many nations to whom iron was not known. In the ancient Scandinavian tumuli recently opened in Denmark, among the various implements of stone were found swords, daggers, and knives, the blades of which were, in some instances, of copper,

and in some of gold, while the cutting edges were formed of iron, showing that this was more rare and valuable than either copper or gold. It has been supposed that several of the ancient nations, as the Egyptians, Greeks, etc., possessed the art of hardening copper, so as to make it serve the purposes of steel. That they employed it for such uses as those to which we now apply tools of steel is certain, and also that the specimens of some of their copper tools are considerably harder than any we make of the same metal. These are found, on analysis, to contain about one part in ten of tin, which, it is known, increases, when added in small proportions, the hardness of copper, and this was probably still further added to by hammering.

Among the most important uses of the metal at present is that of sheathing the bottoms of ships in order to protect the timbers from the ravages of marine animals, and present a smooth surface for the easy passage of the vessel through the water. The metal is well adapted, from its softness and tenacity, for rolling into sheets, and these were first prepared for this use for the Alarm frigate of the royal navy, in 1761. Sheet lead had been in use before this time, but was soon after given up for copper. On account of the rapid deterioration of the copper by the action of the sea-water, the naval department of the British government applied, in 1823, to the Royal Society for some method of preserving the metal. This was furnished by Sir Humphry Davy, who recommended applying strips of cast iron under the copper sheets, which, by the galvanic current excited, would be corroded instead of the copper. The application answered the purpose intended, but soon had to be given up, for the copper, protected from chemical action, it was found, became covered with barnacles and other shell-fish, so as seriously to impair the sailing qualities of the vessels, and for this reason it has been found necessary to submit to the natural wasting of the metal, and replace the sheets as fast as they become corroded.

Various alloys have been proposed as substitutes for copper. That known as yellow metal, or Muntz's, has been the most successful and has been very generally introduced. It consists of copper alloyed with about 40 per cent. of zinc, and is prepared by plunging cakes of zinc into a bath of melted copper contained in a reverberatory furnace. The volatilization of the zinc and oxidation

of the metals is guarded against by a covering of fine charcoal kept upon the melted surface. The bolts, nails, and other fastenings for the sheathing, and for various other parts of the ship, are made also of copper and of yellow metal; and to secure the greatest strength, they should be cast at once in the forms in which they are to be used. The manufacture of all these articles is extensively carried on at the different copper establishments in Massachusetts, Connecticut, and Baltimore.

Sheet copper is also applied to many other very important uses, as for copper boilers and pipes, for large stills and condensers, the vacuum pans of sugar refineries, and a multitude of utensils for domestic purposes, and for employment in the different arts. For engraving upon it is prepared of the purest quality and of different thicknesses, according to the kind of engraving for which it is to be used. The engraver cuts it to the size he requires, planishes it, and gives to it the dead smooth surface peculiar to engraving plates. The smaller utensils of sheet copper, as urns, vases, etc., are very ingeniously hammered out from a flat circular sheet. As the hammering is first applied to the central portion, this spreads and takes the form of a bowl. As the metal becomes harder and brittle by the operation, its softness and ductility are restored by annealing, a process that must often be repeated as the hammering is continued, and toward the last, when the metal has become more susceptible to the change induced by the application of the hammer, the annealing must be very carefully attended to, and the whole process be conducted with much skill and judgment acquired by long experience.

For larger and more common hollow articles, the sheet copper is folded around, and lapped by various sorts of joints, some of which are secured by rivets, and some by a double lap, the two edges locking into each other, and made close by hammering. The edges are also soldered either with soft or hard solder. For the latter an alloy is made for the purpose, by melting in a crucible a quantity of brass, and then stirring in one-half or one-third as much zinc, until the blue flame disappears. The mixture is then turned out into a shallow pan, and when cold the plate is heated nearly red hot, and beaten on an anvil or in a mortar. This is the hard solder of the braziers.

A still more important application of the

copper is in the manufacture of the alloy known as brass; and that called bronze also serves many useful purposes. The former is composed of copper and zinc, the latter of copper and tin. It is a curious fact in metallurgy that brass was extensively manufactured, and used more commonly than any single metal or other alloy, many centuries before the existence of such a metal as zinc was known. It was prepared by melting copper and introducing fragments of the *lapis calaminaris*, an ore of zinc, in which the oxide of the metal is combined with carbonic acid. Charcoal was also added to the mixture, and by the reaction with this the zinc ore was reduced to the metallic state, and at once united with the copper, without appearing as a distinct metal. This process is still in use for making brass, but the more common method is to introduce slips of copper into melted zinc, or to plunge beneath melted copper lumps of zinc held in iron tongs. The proportion of the two metals is always uncertain, owing to the unknown quantity of zinc that is consumed and escapes in fumes. This is prevented as much as possible by covering the melted metal with fine charcoal, and by throwing in pieces of glass, which melt and cover the mixture with a thin protecting layer. Old brass is much used in making new, and the addition of quantities of this to the pot containing the other ingredients, adds to the uncertainty of the composition. The best proportion of the two metals is believed to be two parts of copper to one of zinc, which is expressed by the term "eight-ounce brass," meaning eight ounces of zinc to sixteen of copper. Sixteen-ounce brass—the two metals being equal—is a beautiful golden yellow alloy, called prince's metal. But all brass of more than ten ounces of zinc to the pound of copper is whitish, crystalline, hard, and brittle; of less than ten ounces it is malleable, soft, and ductile. The alloys known as pinchbeck, Manheim gold, bath metal, etc., formerly much in use as imitations of gold, are about three to four ounce brass.

Brass combines a number of excellent qualities, which adapt it for many uses. Its compactness, durability, strength, and softness, render it an excellent material for fine work, and nothing, except tin, perhaps, is better adapted for shaping in the lathe. In use it is not liable to rust by exposure, is easily kept clean, and takes a polish almost as beautiful as that of gold. It is hence a favorite

material for the works of watches and clocks, almost all sorts of instruments in which great hardness is not essential, and for various household utensils, and ornaments upon furniture. In thin plates it is stamped and embossed in figures, and is thus cheaply applied to many useful and ornamental purposes. Its ductility is such, that those sorts containing little zinc are beaten out, as in Dutch gilding, like gold-leaf itself, so as to be used as a cheap substitute for this in gilding in some cases. It is also drawn out into wire, often of great fineness; and of the suitable sizes of this there is a very large consumption in the manufacture of pins, and hooks and eyes. By ingenious machinery the brass wires are clipped to their proper length for pins, pointed, headed, and after being tinned, are stuck in paper, with very little attention from the workmen. This manufacture serves to exemplify the perfection of machinery, and some of the most admirable of this, particularly that by which the finished pins are stuck in their papers, is a peculiarly American invention, and worth, to the manufacturers at Waterbury alone, many thousand dollars annually. The solid-headed pin, made somewhat after the manner in which cut nails are headed, was invented by two citizens of Rhode Island, Mr. Slocum and Mr. S. G. Reynolds. This was before the year 1840. The brass pins and hooks and eyes are covered with a coating of tin by placing them in a barrel, together with about twice their weight of tin in grains, several ounces of cream of tartar, and several gallons of warm water. The barrel is then made to revolve upon its axis, until the pins or other articles are perfectly clean. After this they are boiled in a similar mixture.

Much of the brass of the ancients was properly bronze—that is, a compound of copper and tin. This alloy, in different proportions of its ingredients, is still of very great service. Gun metal—the material of the so-called brass cannon—is composed of copper 96 to 108 parts, and tin 11 parts. The compound resists wear extremely well, but its strength is only about one-half that of wrought iron. Statues, and hard castings for machinery, are formed of this alloy. Messrs. Mitchell, Vance & Co., of New York, have been very successful in casting bronze statues and ornaments, clock cases, &c., which rival the antique bronze in beauty. One of the most noted foundries for the casting of cannon, statues, and bronze ornaments in

the United States is that of the Messrs. Ames, at Chicopee, Mass. The equestrian statue of Washington, in Union square, New York, is one of their most successful productions. The French bronze contains 2 parts of tin, 1 of lead, 6 of zinc, and 91 of copper. Bell-metal is a bronze usually consisting of 7 parts of copper and 22 of tin. The largest bell in the country, that formerly on the City Hall, in New York, weighs 23,000 pounds, and was cast in Boston. The largest number of bells is probably produced at the foundry of the Messrs. Menecy, at Troy, N. Y. The Chinese gong is now an American manufacture, composed of bell-metal, which, after being cast, is forged under the hammer, between two disks of iron. The casting is made malleable by plunging, while hot, into cold water.

As with zinc, copper forms an alloy made to imitate gold, so with tin and nickel it forms a combination resembling silver, known as German silver. The proportions of the metals are 8 parts of copper to either 3 or 4 each of the two other metals. This is used in the manufacture of spoons, forks, and other utensils, and instead of brass in various instruments. It is plated with silver, and is as beautiful as the genuine silver.

Another alloy of copper and tin is the telescope or speculum metal, which consists of about one-third tin and two-thirds copper. It is of a steel-white color, very hard and brittle, and susceptible of a high polish, which is not soon tarnished, qualities that cause it to be used for the mirrors of telescopes.

Copper is largely used in the coinage, pure in the cent, combined with nickel in the three and five cent pieces, and as an alloy in the silver and gold pieces. Copper is also in demand both for electro-plating purposes and for electrotype plates, which have almost superseded the old stereotype plates.

Among the later alloys of copper, is what is called *oroide of gold*, which in its best qualities consists of pure copper, 100 parts; zinc or tin, 17 parts; magnesia, 6 parts; sal-ammonia, 0.5 parts; quicklime, 0.125 parts; tartar of commerce, 9 parts. *Aluminium Bronze* 90 parts copper and 10 of aluminium.

There are several alloys closely imitating silver in which copper is the largest constituent. One consists of 70 parts copper, 20 nickel, $5\frac{1}{2}$ zinc, and $4\frac{1}{2}$ cadmium. *Minargent* consists of 100 parts copper, 70 nickel, 5 tungsten, and 1 aluminium.

CHAPTER III.

GOLD.

ALTHOUGH the discovery of gold mines was the chief motive that led to the settlement of the American continent, those of the United States appear to have escaped notice until the present century. The only exception to this may be in the discovery made by some Europeans of the gold region of northern Georgia at a period long antecedent to the occupation of this district by the whites. Of this fact no written record is preserved; but in working the deposit mines of the Nacoochee valley, in Habersham county, there were discovered, about the year 1842, various utensils and vestiges of huts, which evidently had been constructed by civilized men, and had been buried there several centuries. It is supposed they belonged to De Soto's party, which passed through this region in the sixteenth century on their exploring expedition from Florida to the Mississippi river. The earlier historians hardly mention gold as even being supposed to exist in the colonies. Salmon, in the third volume of his "Modern History," 1746, merely alludes to a gold mine in Virginia, which of late "had made much noise," but does not even name the locality, and evidently attaches no importance to it. In Jefferson's "Notes on Virginia" mention is made of the discovery of a piece of gold of 17 dwts. near the Rappahannock. In 1799, as mentioned by Wheeler in his "History of North Carolina," a son of Conrad Reed picked up a piece of gold as large as a small smoothing iron from the bed of a brook on his father's farm, in Cabarrus county, and its value not being known it was kept for several years in the house to hold the door open, and was then sold to a silversmith for \$3.50. In Drayton's "View of South Carolina," 1802, the metal is stated to have been found on Paris Mountain, in Greenville district. About this time it began to be met with in considerable lumps in Cabarrus county, N. C., and not long afterward in Montgomery and Anson counties. At Reed's mine, in Cabarrus, the discovery by a negro of a lump weighing 28 lbs. avoirdupois, near the same stream already referred to, led to increased activity in exploring the gravelly deposits along the courses of the brooks and rivers of this region, and numerous new localities of the metal were rapidly discovered. A much larger proportion of

gold was collected, during these earlier workings, in coarse lumps than in the operations of later times—pieces of metal of one to several pounds weight being often found. Before the year 1820, as stated in *Bruce's Mineralogical Journal* (vol. i., p. 125), the quantity of American gold received at the mint at Philadelphia amounted to \$43,689. All of this was from North Carolina. In 1827 there had been received from the same source \$110,000. But besides this amount, a considerable proportion of the gold product was consumed by jewellers, who paid a better price than was received from the mint, and was retained by the banks, in which it was deposited. It also circulated to some extent as a medium of exchange in the mining region, being carried about in quills, and received by the merchants usually at the rate of ninety cents a dwt. The total product of the mines must, therefore, have been much larger than appears from the mint returns. In 1829, Virginia and South Carolina began to appear as gold-producing states—there being deposited in the mint from the former gold to the value of \$2,500, and from the latter of \$3,500. The same year the rich gold deposits of northern Georgia were discovered, and suddenly became very productive, so that the receipts at the mint from this state for the year 1830 amounted to \$212,000. Gold mining had now become an established branch of the productive industry of the states, and as its importance increased, the necessity was felt of the establishment of branch mints in the mining region. One was constructed by act of Congress at Dahlonega, Lumpkin county, Georgia, and another at Charlotte, Mecklenburg county, N. C.; and both commenced coining gold in 1838. From the irregular manner in which the gold deposits were worked, and their uncertain yield, the annual production of the mines was very variable. In a single year the mint at Dahlonega received and coined gold to the value of \$600,000; and until the discovery of the California gold mines, the American production was estimated to average annually about \$100,000. It was, however, gradually declining in importance from the year 1845; and of late years has dwindled away, so as not to amount to enough for the support of the branch mints, the abolition of which by act of Congress was generally looked for in 1857 and 1858. The late introduction at the mines of North Carolina and Georgia of the hydraulic and

sluice washing, which has proved highly successful in California, gives encouragement that these mines may again soon become as productive as before.

The rock formations of the United States, in which gold mines are worked, follow the range of the Appalachians, and are productive chiefly along their eastern side in a belt of country sometimes attaining a width of 75 miles, as along the southern part of North Carolina, and in Georgia in two distinct belts which are separated by a district of formations unproductive in gold. The extreme northern gold mines on this range are in Canada East, upon the Chaudiere river and its tributaries, the Du Loup and the Touffé des Pins. In 1851 and 1852, deposits were worked upon these streams, and about 1,900 dwts. were collected—found among the gravel which lay in the crevices formed by the ragged edges of the upturned argillaceous and talcose slates. The pieces were all small, only one weighing as much as 4 ounces. The returns were not sufficient to cover the outlays, and the working was consequently abandoned.

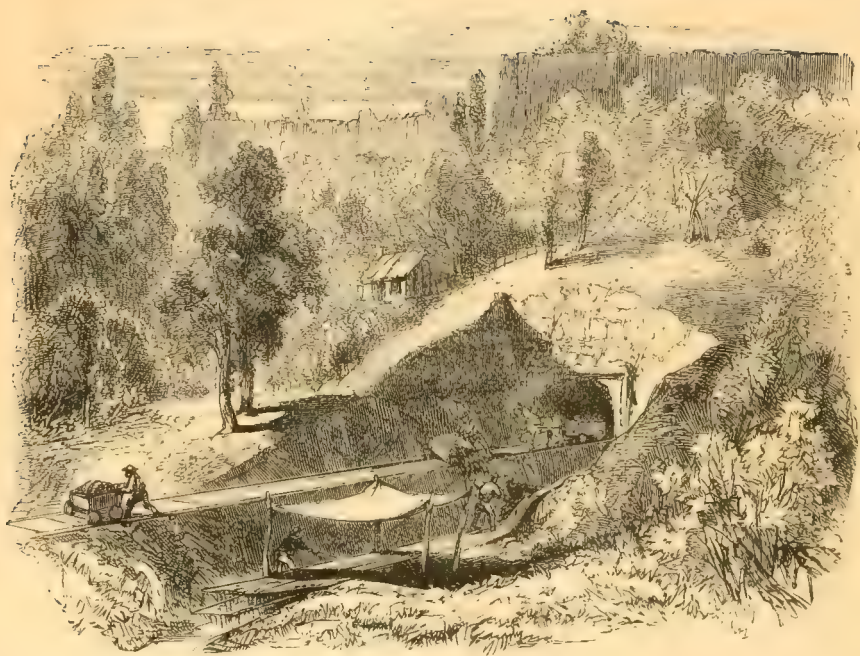
The next localities on the range toward the south which have furnished gold are in Vermont, on the western border of Windsor county, in the towns of Bridgewater and Plymouth. At Newfane, in Windham county, a piece of gold was found in 1826, which weighed 8½ oz.; but the only successful attempts to work the deposits were commenced in 1859, in Windsor county, and have since been prosecuted to limited extent. At Bridgewater, the gold has been found in place, in a quartz vein, associated with galena, and pyritous copper, and iron. It has not proved sufficiently rich to work. Through western Massachusetts and Connecticut, and the south-east part of New York, and through New Jersey and Pennsylvania, the talcose and argillaceous slates, and the other rocks of the gold belt, appear to be unproductive in this metal, a little gold only having been met with in some of the ores worked for lead and copper in Lancaster county, near the borders of Maryland. Specimens of quartz rich in gold have been found in Montgomery county, in the last-named state; but no mine has been worked there.

In Virginia the deposit mines of Louisa county especially were very productive even in 1833, and they had not been worked long before rich veins were found, and operations



HYDRAULIC MINING.

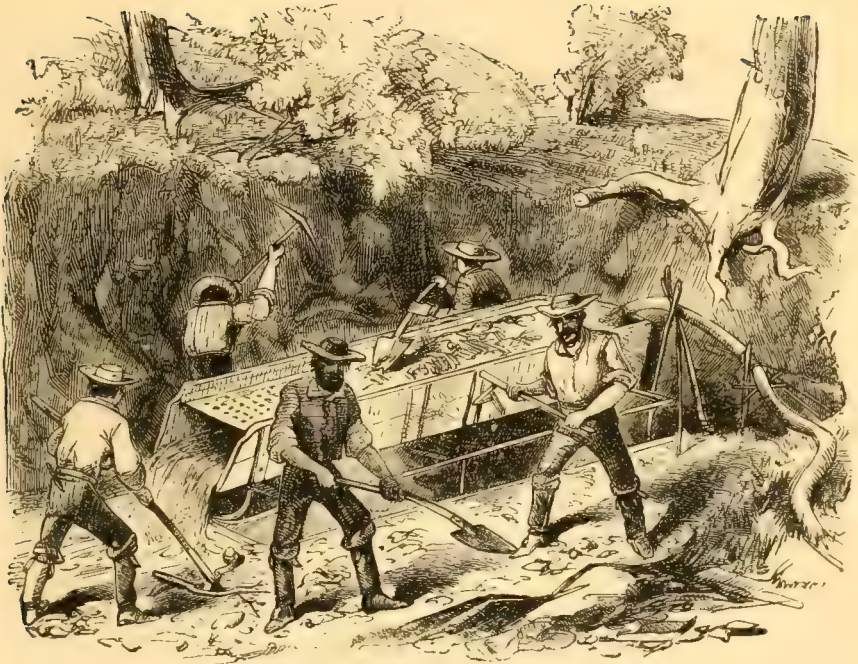
By this operation, as described in the text, hills of loose materials or of decomposed slates and other rocks containing gold, are washed down, and the earthy matters are swept away through the sluices made either of wooden troughs or by excavating channels in the bed-rock. In these the coarse gold is caught against the bars placed at intervals across the sluices. This is a purely Californian method, and has proved so effectual in collecting the little gold buried in large bodies of earth, that it is now generally adopted in other gold regions in which the conditions are favorable for its practice.



TUNNELLING AT TABLE MOUNTAIN, CALIFORNIA.

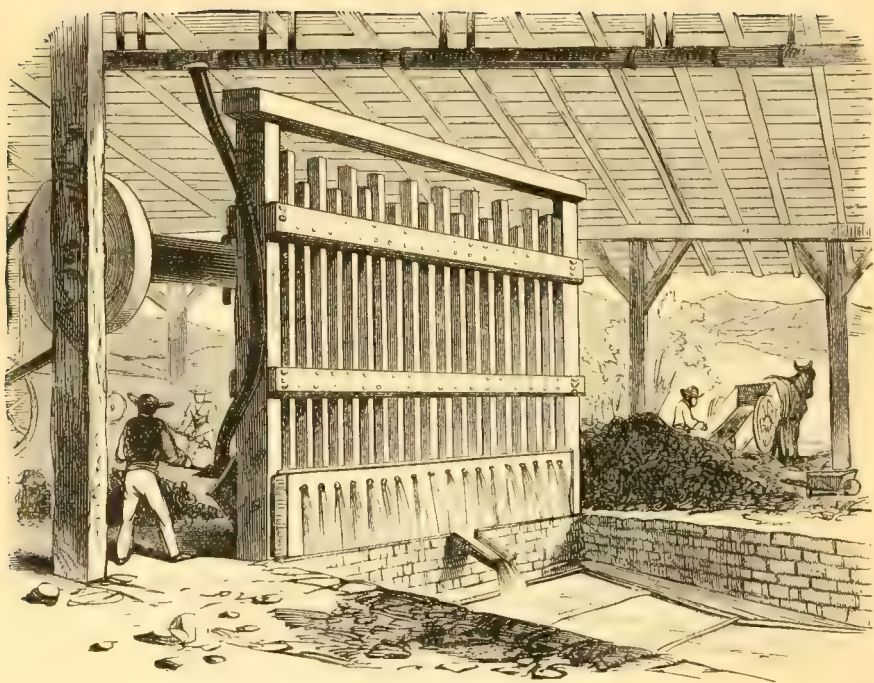
This represents a common method of reaching beds of rich ores that lie at considerable depths below the surface, by which the labor of removing the superficial deposits is avoided. Veins of ores, whether lying at a steep or gentle inclination, are often explored by such tunnels driven in upon their course. The sides and roof may be protected or not, as the ground is soft or solid, by timbering.

At the outside of the tunnel below the railroad track is the machine called the "long tom," a shallow trough, ten to twenty feet long, and about sixteen inches wide. The lower end, which turns up gently from the plane of the bottom, is shod with iron and perforated with holes. The water from the mine is turned on the upper end, and flows up this slope and through the holes, carrying with it the finer mud and sand which are continually thrown into the tom. One man at the lower end keeps the mud in motion and removes the coarse lumps. Under the lower end of the tom is placed a "riffle box," in which mercury may be used to advantage if the gold is in fine particles.



LARGE ROCKER USED IN CALIFORNIA WITH QUICKSILVER.

The above cut represents a rocker of unusual dimensions, which has been introduced in some places in California, and is employed particularly for auriferous deposits in which the gold is in too fine particles to be caught in the long tom. It is slightly inclined, and is rocked by one man while the others collect the gravel and throw it upon the perforated iron plate. Across the bottom of the trough are placed "riffle bars," and behind each one of these some mercury. The fine particles of gold coming in contact with this are caught and retained in the form of amalgam. The coarse gravel falls off the lower end of the plate, while the fine mud and sand are washed by the water through the holes in the plate.



STAMPS FOR CRUSHING GOLD ORES.

This cut represents a common form of stamps, such as are used for pulverizing auriferous quartz or other ores. They are variously arranged at different mills; sometimes four or five running in one set, and several sets being placed on the same line, but separate from each other. This arrangement is more convenient for stopping a portion at a time as may be required for repairs or for collecting the very coarse gold under the stamps which cannot pass through the grating or the plates, perforated with many holes, that are usually employed in front of the stamps.

upon these had been carried on to considerable extent previous to 1836, principally in the counties of Spottsylvania, Orange, Louisa, Fluvanna, and Buckingham. Some of the mines produced at times very rich returns, but their yield was, for the most part, exceedingly irregular, the gold occurring in rich pockets or nests, very unequally scattered in the vein. The occasional richness of the veins caused the attention of wealthy capitalists in this country and in England to be directed to this region, and large outlays were made, in providing powerful engines and other suitable machinery for working the ores, and in opening the mines. But, although the operations have been directed by the best mining skill, supported by abundant capital, the enterprise, on the whole, has not proved successful, and since 1853 the business has greatly declined in importance.

In North Carolina numerous quartz veins have been worked during the last 30 years, and operations are still carried on with moderate success at several mines in Guilford, Davidson, Montgomery, Cabarrus, Rowan, and Mecklenburg counties. Deposit mines have been worked with great success, also, in Burke, Rutherford, and McDowell counties. At a single time, it is stated, there might have been seen, from one point of view in McDowell county, no less than 3,000 persons engaged in washing the deposits. In this district sluice-washing has recently been successfully introduced by Dr. Van Dyke, who is also engaged in the same process in Georgia. The most important group of mines is at Gold Hill, on the southern line of Rowan and Cabarrus counties. Mining operations were begun here in 1843, and for 10 years the annual product averaged about \$100,000; the last four years of this period more than one-third of all the gold coined at the Charlotte mint was from Gold Hill. In 1853 the property was purchased by a New York company, by which it has since been worked, but with greatly reduced profits, although the mines have been furnished with the most efficient machinery. These are the deepest gold mines in the Atlantic states, one of the shafts having now reached the depth of 680 feet. The ore is pyritous iron, containing gold in particles rarely visible, and probably chemically combined with the iron and sulphur in the form of a double sulphuret. It is separated with difficulty, and very imperfectly, by the processes of crushing and amalgamating; and the immense

heaps of tailings collected below the mines, amounting probably to over two million bushels, still retain quantities of gold worth from fifty cents to two dollars the bushel. In Davidson county a mine was opened in 1839, which produced in the three succeeding years about \$7,000 worth of gold, when the ore was proved to be more valuable for silver than for gold. These metals were associated with a variety of metallic ores, among which the sulphuret, carbonate, and phosphate of lead were especially abundant. Furnaces were constructed for reducing these, and separating the silver obtained with the lead. This is the only mine east of the Rocky Mountains which has furnished any considerable amount of silver to the mint. It is now known as the Washington mine.

Although many gold mines have been worked in South Carolina, the only one of much note is the Dorn mine, in Abbeville district. In 1850 this mine, then quite new, produced gold to the value of \$19,000, and in 1852 the production rose to \$202,216, although the mine was provided with very imperfect machinery and worked in a very rude manner. This large yield was, however, of short duration, the gold occurring in great quantity only in streaks or pockets upon a short portion of the vein.

The Georgia gold mines, first worked in the north-east part of the state in 1829, were soon found to extend south-west into the country beyond the Chestatee river, which was then possessed by the Cherokee Indians. In 1830 the borders of this territory were overrun by a reckless set of adventurers, notwithstanding the attempts made, first by a force of United States troops stationed for the protection of the Indians, and afterward by Georgia troops, when the state extended her laws in 1830 over the Cherokee country. On the removal of the Indians, their lands were distributed in 40 acre lots, by lottery, among the inhabitants of the state, and thus titles were obtained to the gold mines. The deposit mines yielded richly for a few years, and the whole product of gold for the first ten years of their working is supposed to have amounted to \$16,000,000, a large portion of which never reached the United States mints, but was distributed in barter throughout the neighboring states and worked up in jewelry. From 1839 to 1849 the production did not probably exceed \$4,000,000. A number of quartz veins were opened in Habersham, Lumpkin, Cherokee, Carroll, Colum-

bia, and other counties, and considerable amounts of gold were obtained from these. They were, however, generally abandoned when the workings reached a depth at which machinery would be required for draining the mines. In Columbia county, about 20 miles from Augusta, the McCormack mine has been worked without interruption for about 20 years steadily, producing very fair profits. The gold is found in small particles in a honey-combed quartz, which contains but little pyrites and some galena. Nearly all the gold was obtained within 70 feet of the surface.

In Lumpkin county the gold is found in immense beds of decomposed micaceous and talcose slates, which, too poor to be worked by the slow process of crushing the whole material in mills and then washing away the earthy matter, will probably well repay the more thorough system of operations according to the California hydraulic process. After these beds had remained neglected for many years, Dr. H. M. Van Dyke, who had gained experience in California, and already applied it in introducing the system into North California, found in Boston, Mass., capitalists who agreed to furnish the money required for securing the richest tracts in the vicinity of Dahlonega, and conveying to them the water for washing down the hills on the plan, which will be more particularly noticed in speaking of the California mines. In 1858 he commenced operations, which have since been actively conducted; taking the water of the Yahoola river at a point about 13 miles above the spot where it will be first used, and conveying it by a canal or ditch over the more elevated portion of the country, crossing the valleys by means of sluices supported upon trestle-work, the height of which gradually increases with the descent of the streams, until at the crossing of the Yahoola near Dahlonega the high trestle now in construction is at the level of 240 feet above the bed of the river, with a span between the hills of 1,400 feet. Beyond this crossing the canal is to be extended two miles further, to reach the rich deposits upon which the hose washing will be first applied. It is expected that the arrangements will be completed early in 1861, and that from the numerous localities controlled by the company, at which the water can be used to advantage, the proceeds will revive the reputation of the Georgia gold mines.

Another association was formed in Boston

in 1857, called the Nacoochee Hydraulic Mining Company, for the purpose of applying the same system to the high grounds in White county, recently a part of Habersham, in which are the mines of the Nacoochee valley and its vicinity, at one period highly productive, and where many deposits exist at so great an elevation, that no water has heretofore been brought to bear upon them. By damming the Nacoochee river, this company can carry water to these points; and their arrangements are already nearly completed. In some experimental trials they have, by the use of a current of water that would flow through a six-inch pipe, obtained several hundred dollars per week with the labor of two miners. From one spot more than 1,500 dwts. were washed out in small nuggets, several of about 100 dwts. each, and one of 387 dwts. The value of these is \$1 the dwt., and of the gold dust 97 cents. The auriferous belt of rocks consists of alternating beds of micaceous, hornblende, and talcose slates and gneiss, which stand nearly vertically, and contain between their layers bands of quartz. The gold is found in the quartz and in the auriferous pyrites accompanying it, and to some extent in the slates also. Detached or "free" gold is also met with, derived, no doubt, from pyrites which has decomposed and disappeared. From the general disintegration of the edges of these strata, gold has been distributed in the deposits around.

From Georgia, the gold-bearing rocks are traced into eastern Tennessee, where they have been worked along the range of the Coweta and Smoky Mountains; and from the south side of the Blue Ridge, in Georgia, they have proved productive in a south-west direction, through Carroll county, into Alabama; but the formation is soon lost in the last-named state.

The gold regions along both slopes of the Rocky Mountains are, however, the most remarkable yet discovered on this continent. In COLORADO, "the whole range of mountains seems crowded with veins of rich mineral ore. They run into and through the hill sides like the bars of a gridiron—every hundred feet, every fifty feet, every twenty feet." The first and largest development of these mines lies along and up the Clear Creek and centres around its sources. The principal mining villages of this section are Central City, Black Hawk and Nevada. Another centre of productive mining interests

is in the South Park. The gold in Colorado is combined with sulphur and forms a sort of pyrites. This renders its extraction more difficult; but processes have lately been devised which, without increasing materially the expense, will raise the production of gold per cord of ore to three or five-fold what it has hitherto been. There are also large deposits of gold in New Mexico and Utah, which are not yet developed to any considerable extent.

IDAHO and MONTANA are also immensely rich in gold mines and placers. The Boise Basin, in Idaho, has yielded, and still yields to the placer miner in many parts a fair return for his labor, and possesses, beside, many valuable gold-bearing quartz leads. The South Boise has also many valuable leads. The Owyhee mines, sixty miles south of Boise City. They are almost entirely silver-producing, though some gold is extracted from the silver. In Montana, the placer diggings are yet paying largely, and the quartz leads are richer in gold than in any section yet discovered; and the two localities which have been thus far principally worked, Alder Gulch, and the vicinity of Helena, about one hundred and fifty miles apart, are yielding both gold and silver in great profusion.

Still another region rich in gold, richer perhaps than either of the others, though as yet developed with difficulty, on account of the hostile and treacherous Indians who roam over it, is the Territory of Arizona. Its gulches and cañons abound in the precious metal, and it cannot be long before they yield in profusion their long hidden wealth. The completion of the Pacific railroad will soon make this wealth available.

The most important gold region of the United States and of the world is that of California. Its development has not only largely multiplied the previous gold production of the globe, but it has been the means of rapidly bringing into the use of civilized nations large territories of productive lands, which before were an unprofitable wilderness, founding new states, enlarging the commerce of the world, and bringing into closer intercourse nations which before were the most widely separated. At the period when the wealth of the gold mines of California began to be realized, the annual production of gold throughout the world had gradually fallen to about \$20,000,000, and more than half of this was furnished by Russia alone. In 1853,

only five years later, California produced an amount estimated at \$70,000,000, and the total production, through the supplies, nearly as large, furnished at the same time by Australia, had increased to almost double this amount. Little was known of California previous to the discovery of gold at Sutter's mill, on the American fork of the Sacramento, in February, 1848; yet its being a country containing gold was made known by Hakluyt in his account of Drake's expedition of 1577-9, and by Cavello, a Jesuit priest of San José, Bay of Francisco, who published a work on the country in Spain in 1690. Reports from later travellers confirmed these statements at various times, and in *Hunt's Merchants' Magazine* for April, 1847, a report is presented by Mr. Sloat, which speaks in very decided terms of the richness of the gold placers of the country, as noticed by him during his observations of the two preceding years. The Rev. C. S. Lyman, in a letter written to the editor of the *American Journal of Science* from San José, in March 1848, notices the discovery of the preceding month as very promising. In August of that year it was reported that four thousand men were engaged in working the deposits on the American fork, and were taking out from \$30,000 to \$40,000 a day. This comprised a large portion of the population of California. San Francisco was almost deserted, and people were pouring in from distant regions. The next year the emigration commenced in the United States, both by sea around Cape Horn, and across the plains and Rocky Mountains in large parties. By the close of the year 1849 the number of persons engaged in mining was estimated at from 40,000 to 50,000 Americans, and about 5,000 foreigners: the total product of gold at about \$40,000,000. The mining district was traced up the valley of the Sacramento toward the north, and the continuation of the same formations up that of the San Joaquin in the opposite direction was also beginning to be understood. Along the valleys of the streams, which flowed into these rivers from the Sierra Nevada range to the east, gold was almost everywhere found, and upon the hills and elevated plains it was met with beneath the sands and clays which covered the surface to the depth of fifteen to thirty feet or more; all the materials, earthy and metallic, appearing either to have been derived from the superficial disintegration of the slaty formations, or to have been depos-

ited by ancient rivers, which have since been diverted in other directions. Deposits of this character were called dry diggings, and, except in the wet season, were worked to great disadvantage for the want of water to separate the earthy matters from the gold. In the bottoms of the streams the deposits contained much coarse gold, derived from the wearing down of the slate formations through which they had made their way in their rapid descent from the Sierra Nevada mountains. By the excavation of the vast gulches or ravines of these streams, some of which presented precipitous walls of about 3,000 feet in height, an immense amount of gold must have been removed from its original beds, which, as the lighter earthy matters were swept down the rivers, remained behind, forming the riches of the auriferous deposits. The country of this peculiar character was found to extend along the western slopes of the Sierra Nevada for 400 or 500 miles, and the gold-bearing slates to spread over a width of from forty to sixty miles.

Whether or no the natural processes by which the gold had been collected from its original beds suggested to the California miner an improved method of washing the auriferous formations upon a gigantic scale, it was soon found that the richness of the deposits would justify, especially in the dry diggings, large outlays in conveying water from great distances by canals or ditches, and applying this, either under the pressure of a great head, to tear up the material from its bed and wash away the earthy portions, or to wash the auriferous gravels as these were carried to the water sluices and thrown into them for this purpose. On this plan hydraulic operations were soon laid out of extraordinary extent. Currents were diverted well up the slope of the Sierra Nevada mountains, and conveyed in canals along the sides of the hills, and in sluices, supported upon trestle-work, from one hill to another, sometimes at a height of more than 200 feet above the bottoms. On the hills where the water was required for "hose washing," it was taken from the canal or sluice in a large and strong canvas hose, to the lower end of which a nozzle, like that of a fire engine, was attached. The least head for efficient service was about 60 feet, and a head of 100 feet was used where it could be had and the hose would bear it. Large hose and nozzles proved much more efficient than several

smaller ones of equal or even greater capacity. As estimated by Mr. Wm. P. Blake, with a pipe of an inch and a half or two inches aperture, and a pressure of 90 feet head, a boy can excavate and wash as much auriferous earth as 10 or 15 men by the ordinary methods. In suitable places, where the waste water can flow rapidly away though the sluices made for its channel and for catching the gold, the jet of water is directed against the side of a hill, which it rapidly excavates, sweeping off the earthy portions, undermining the trees, and rolling down the loose stones, and, where the ground is favorable for the operation, cutting every thing away, it may be to a depth of 100 feet from the top to the bottom of the excavation, leaving behind barren acres of loose stone in unsightly piles—a perfect picture of desolation. At the close of the year 1858 it was estimated that the artificial water-courses already constructed for mining purposes in California amounted to 5,726 miles in length, and their cost to \$13,575,400; and besides these there were branches not enumerated, and others in construction, to the extent of about 1,000 miles more. Among the principal of these canals are the Columbia and Stanislaus, in Tuolumne county, which is 80 miles long, and cost \$600,000; the Butte, in Amador county, 50 miles long, cost \$400,000; that of the Union Water Company, in Calaveras county, 78 miles long, cost \$320,000; and that of the Tuolumne Hydraulic Company, 60 miles long, cost \$300,000. Notwithstanding the cost of these enterprises, they have proved in general highly profitable, paying, after deducting the expenses of keeping them up, from one to more than five per cent. a month. The water is sold to the miners by the canal companies at so much per inch of the discharge—this being from a horizontal aperture, one inch high, at the bottom of a box in which the water is kept six inches deep. The length of the aperture is regulated by a slide. The price has fallen from \$3.00 an inch per day in 1851, to 50 cents in 1854, and is now still less.

Sluice-washing, which is a necessary part of the hydraulic or hose process, is also carried on independently of it, and by a method which was first adopted in California. Channels are made sometimes upon the surface of the slaty beds in place, the ragged edges of which are very favorable for catching the gold, or sometimes of boards,

in the form of an open trough, a foot or 15 inches in width, and 8 or ten inches deep, which are extended to several hundred feet in length. These are set at a suitable slope, usually about one in twelve, and "riffle" bars are laid across to obstruct the flow of the heavy metallic particles which sweep along the bottom, while the muddy portions and stones are carried over with a flow of the water, and discharged at the lower end. Fresh gravel is continually shoveled into the sluices, and once a day, or oftener, these are cleaned up to collect the gold from the riffles and pools, which are sometimes used at the head of one joint of the sluice to receive the discharge from the next one above. Where the descent is rapid enough to keep the pool "in a boil," a considerable portion of the gold may be caught in it, especially if mercury be introduced.

In 1851, attention began to be turned to the quartz veins, or "ledges," as they were called, and numerous companies were soon established in the United States and in England for carrying on regular mining operations upon these. Within five years after, many deep shafts had been sunk upon veins in different parts of the country, and mills were in operation, furnished with the most efficient machinery for crushing and washing the ore. The uncertain supply of water, and the great expense attending the procuring it by canals from a distance, operated for a time strongly against the success of these works. Upon the Mariposa estate, once the property of Gen. J. C. Fremont, one of the earliest and most extensive experiments in quartz mining was made. The quartz veins on that estate were not so rich as some which have since been discovered elsewhere, yielding by the old Mexican process with the arastee only eight or nine dollars to the ton. By a new and improved method, known as the "Eureka Process," the yield was increased to forty or fifty dollars per ton, and from the Princeton mine alone over three million dollars were taken out before 1867. Had this noble property been wisely or well managed, it would have made the General the wealthiest of American millionaires; but, unfortunately, prosecuting his great schemes too rapidly, he fell into the hands of men who stripped him of his grand estate and squandered its profits.

But whatever may be the ultimate fate of this great estate, the success of quartz mining

in California is assured; there were in the State, in the spring of 1868, 472 quartz mills carrying a total of 5,120 stamps, and nearly all were doing a profitable business. There is, of course, a great difference in the yield of different veins; some after a period of great productiveness, coming upon a considerable stretch of barren quartz, where the yield is insufficient to pay expenses, and then passing on to a gangue richer and more productive than the portion of the vein first opened. Others will have the precious metal in "chutes" or "chimneys" scattered here and there along the course of the vein, which are enormously productive while the intervening portions are entirely barren. Others still will yield a steady and very uniform percentage, not large but fair. In general it may be said that quartz mining yields a more certain though more moderate success than any other kind of gold mining.

The total production of the mines of California, from the commencement of extensive mining there to the year 1870, was as follows, according to the best authorities:

1848,.....	\$10,000,000	1860,.....	\$45,000,000
1849,.....	40,000,000	1861,.....	40,000,000
1850,.....	50,000,000	1862,.....	34,700,000
1851,.....	55,000,000	1863,.....	30,000,000
1852,.....	60,000,000	1864,.....	26,600,000
1853,.....	65,000,000	1865,.....	28,500,000
1854,.....	60,000,000	1866,.....	26,500,000
1855,.....	55,000,000	1867,.....	25,000,000
1856,.....	55,000,000	1868,.....	28,000,000
1857,.....	55,000,000	1869,.....	27,800,000
1858,.....	50,000,000	1870,.....	28,500,000
1859,.....	50,000,000		
			\$945,600,000

The deposits of gold at the mint, and its branches, for the year ending June 30, 1870, were \$29,485,263.45. Of silver, for the same time, \$3,504,942.51. Total deposits \$32,990,210.96.

The coinage for the same period was—gold coin, number of pieces, 1,156,087; value, \$22,257,312.50; unparted and fine gold bars, \$87,846,052.25; silver coin, pieces, 4,649,398; value, \$1,767,253.50; silver bars, \$902,800.66; nickel, copper, and bronze pieces, 18,154,000; value, \$611,445; total number of pieces struck, 23,961,292; total value of coinage, \$33,384,863.91.

New localities are tested by trying the earth in different places, by washing it in an iron pan or upon a shovel, an experienced hand readily throwing the heavy particles by themselves, while the lighter are allowed to flow away. This method is one of the

means in use for collecting gold upon a small scale, and the Mexicans of the gold regions, by long practice, are particularly expert in it. If a vein is to be tested, the quartz is finely crushed, and the powder is then washed in the same manner. Gold may be thus brought to view when none was visible in the stones, however closely examined. By placing a little mercury or quicksilver in the pan, the gold will be more perfectly secured, as, by coming in contact with each other, these metals instantly unite to form a heavy amalgam, and the mercury thus holds the finest particles of gold so that they cannot escape. The mixture, separated from the sand, is squeezed in a piece of thick linen or deerskin, through which the excess of mercury escapes, leaving the amalgam. This may then be heated on a shovel, when the mercury goes off in vapor, and the gold is left in its original-shaped particles, cohering together in a cake. If the quantity of amalgam is considerable, it is distilled in a retort, and the mercury is condensed to be used again. This amalgamation fails entirely if the slightest quantity of any greasy substance is present, as a film of the grease coats every portion of the mercury, and effectually prevents its contact with the gold. These processes contain the principles of nearly all the methods in use for separating gold. A great variety of machines have been based upon them, the simplest of which have proved the most valuable. The Burke rocker has always been a favorite machine in the southern states, and has been largely used in California by small companies of miners, and in localities where operations were not carried

on upon a very extensive scale. It is a cradle-shaped trough, about six feet long, set on two rockers, the upper end a few inches higher than the lower, and placed so as to receive at its head a current of water from the end of a leading trough above. This falls upon a perforated iron plate, set as a shelf in the machine, and upon this the auriferous gravel is thrown. The finer particles fall through as the rocker is kept in motion by hand, and the coarse gravel rolls down to the lower end, and falls off upon the ground. Across the bottom of the rocker are placed, at intervals of 6 or 8 inches, low bars or partitions which catch the heavy sands, and prevent their being washed out of the lower end with the water and mud. This lower portion is sometimes arranged as a drawer, which can be secured by a lock, so that the gold which falls into it is safe against robbery. The drawer is called the "rifle box." Some rockers are mere open troughs without a shelf. The "tom" is often preferred to the rocker, which it resembles, except in its being a trough without rockers, on the plan of the sluices already described. Both it and the rocker are of convenient size for moving about from one place to another, as the working of the deposit advances.

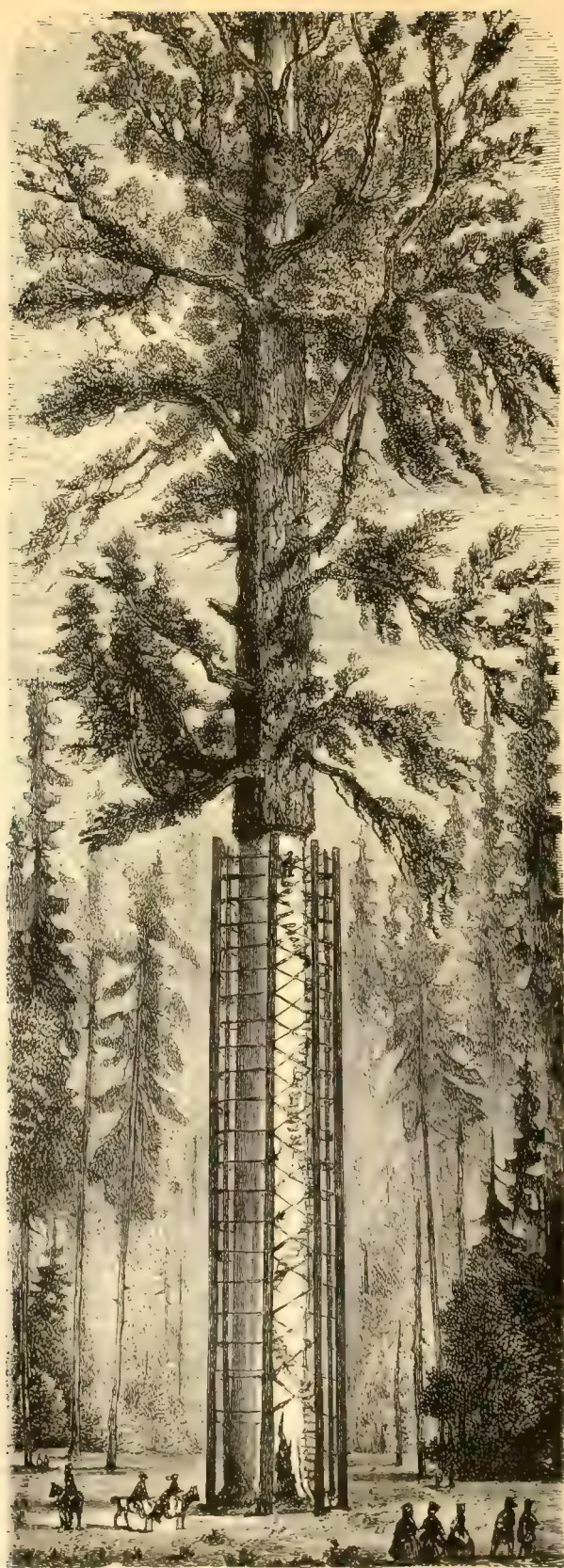
Vein mining requires more efficient machinery, and stamping mills are constructed as near as may be to the mines, for reducing the stony materials to powder, and the sands from the stamps are passed through a variety of machines designed to catch the gold. Stamps are solid blocks of the heaviest cast iron attached to the end of a wooden or iron rod called the leg, to which the lifting cam is applied for raising them. They commonly weigh about 300 lbs. each, though in California they are made of twice and even three times this weight. Several of them are set together in a frame side by side, and are lifted in succession by the cams upon a horizontal shaft, which revolves in front of them. The bed in which they stand, and into which the ore to be crushed is thrown, is sometimes a massive anvil, hollow in the top, firmly imbedded in a heavy stick of timber, or is formed of stones, beaten by the stamps themselves into a solid bed. Water is usually supplied in small currents to the stamps, and sometimes mercury also is poured into the bed. The only exit for the crushed materials is through small holes punched in a sheet of copper, of which the



BURKE ROCKER.



YOSEMITE VALLEY.



FATHER OF THE FOREST.



GOLD MINING IN CALIFORNIA.



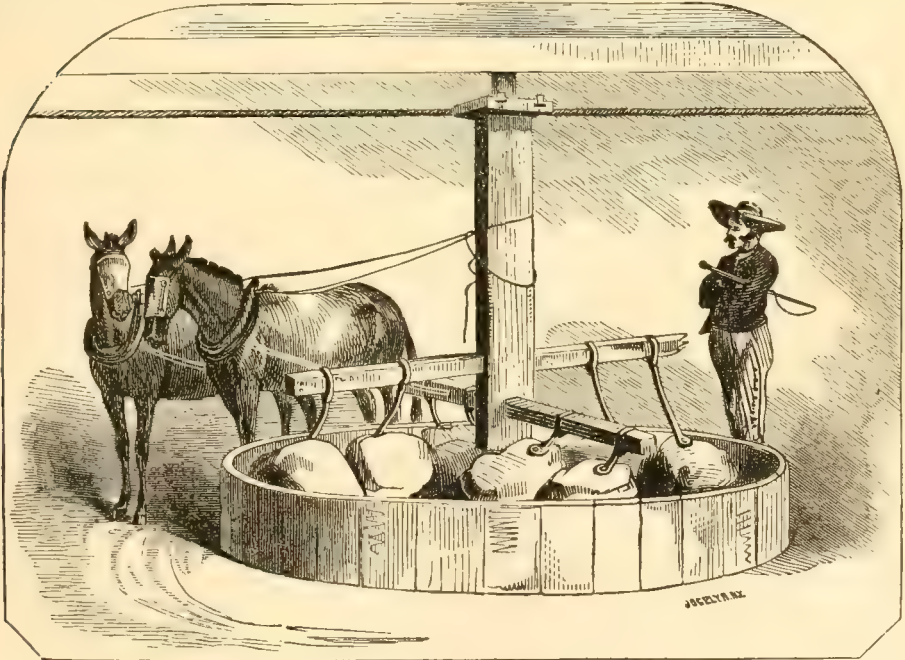
PROSPECTER IN CALIFORNIA GOLD MINES.



CHINESE IN CALIFORNIA GOLD MINES.

side of the boxing around the stamps is formed, opposite to that at which the ore is fed. Through these holes the mud and water are projected with every blow into a capacious box, the floor of which inclines gently back toward the stamp, and contains along this edge a quantity of mercury, in which a considerable portion of the gold is caught. From the box a spout leads the current into the other machines, often through an inclined trough, in the bottom of which baize or blanket stuff is laid for the purpose of entangling in its fibres the particles of gold that are swept along. These are frequently taken up and cleaned. Much of the gold, however, always escapes them, and the current is variously treated before it is finally allowed to flow away. The sands require to be more finely pulverized, and the current first flows into mills of some sort, as the Chilian mill, arrastre, etc. The former consists of a pair of heavy wheels of granite, from four to six feet in diameter when new, set in a horizontal frame, one on each side of an upright shaft, and carried around with the shaft as it revolves upon its axis. The stones

They revolve in a water-tight box or tub upon a granite floor. Sometimes they are used in the place of stamps for breaking up the coarse ore; and worked at the rate of eight to twelve revolutions a minute, they should crush to fine sand from one to two tons of quartz in twelve hours. The water, which flows in one side the tub, passes out over the opposite edge with the light slime and fine mud, while much of the gold remains in the bottom, caught by the mercury placed there to secure it. The arrastre is something like the Chilian mill, only instead of revolving stones, heavy flat ones are dragged round with the shaft by chains, secured to the horizontal arms. These machines in Mexico are worked by horses or mules, but in this country by water or steam power. The slowness of their operation is not regarded as an objectionable feature, but on the contrary is favorable for effectually securing the gold. Among the simplest and best contrivances employed below the Chilian mill are the "shaking tables." These are platforms seven or eight feet long, of plank in a single piece, as wide as can be procured.



CRUSHING MILL, OR ARRASTRE.

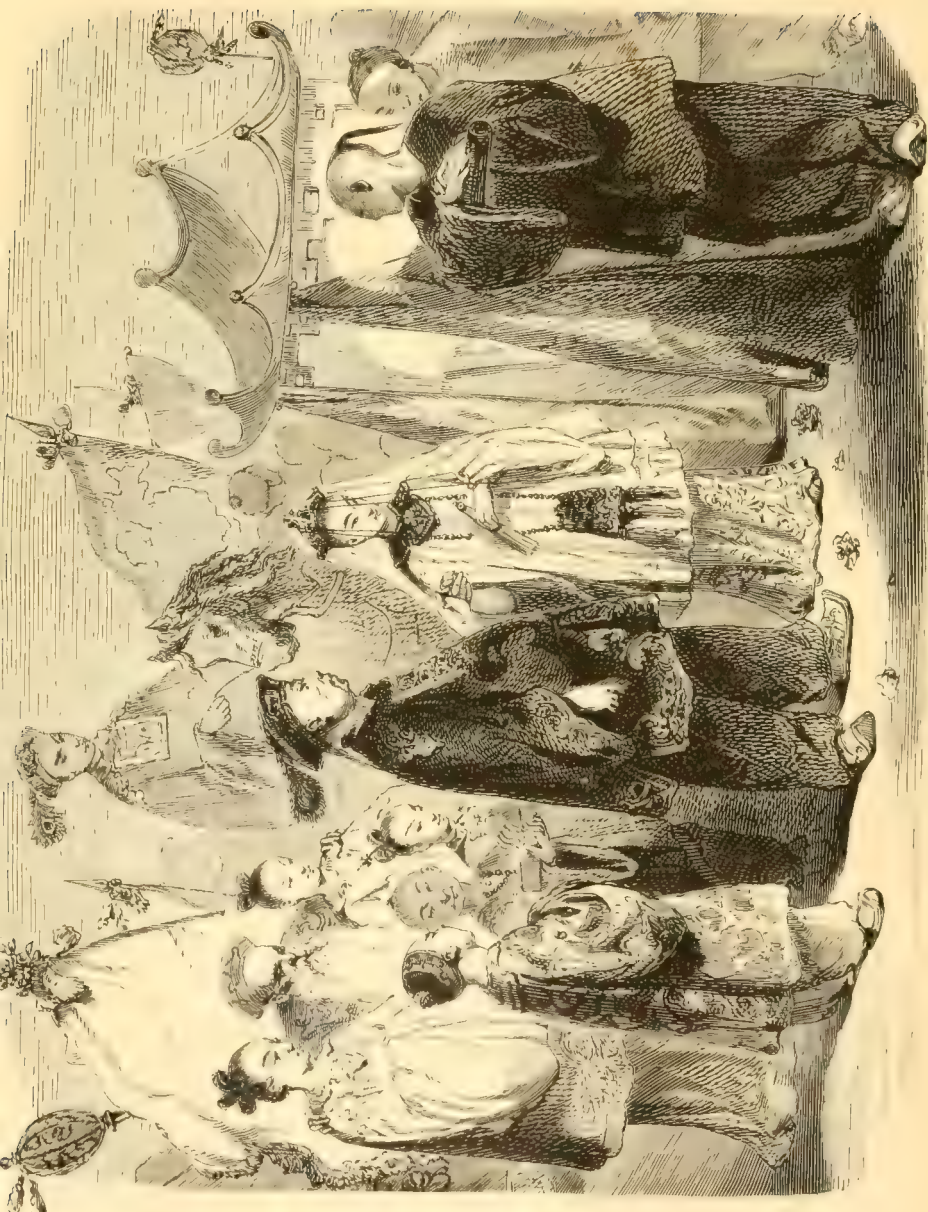
being as close as possible to the shaft, have a twisting motion which acts powerfully to grind the particles crushed by their weight.

The planks, of two inches thickness, are worked down from a line across the middle to a thin edge at one end, and from the other

end they are made to diminish to half an inch thickness at the line across the middle. Each one is furnished with sides, and a strip across the thin end of six inches in height, the joining made perfectly tight, and is then swung between four posts in a horizontal position by four rods or chains, which should be at least eight feet long. Mercury is poured into the two divisions, until they are more than half filled. The sands are made to flow in upon the thin end, and are received upon the surface of the mercury; and the table is made to swing forward and back by the revolution of a crank. By the motion the sands are mixed in with the mercury, and swept along in successive waves, and falling over the middle ridge are treated in the same manner in the succeeding division. The mercury is retained by its weight in the depressed portions of the table, and the water and sands are discharged over the open end. Of the numerous machines designed for effecting the amalgamation of the gold patented within the last few years; few involve any new principles, but are merely modified forms of the old contrivances. Prof. A. K. Eaton, of New York, found that amalgamated metallic surfaces could be made to collect most completely the very fine particles of gold, which by all other processes it has been found impossible to secure. The use of copper, brass, or zinc proved troublesome and impracticable from the rapidity with which they were dissolved in the mercury, adulterating the amalgam. An amalgamated iron surface proved to be free from this objection, and the following description of apparatus was finally decided on as the most efficient: A circular plate of wrought iron is amalgamated over what is intended to be its inferior surface, and an open tube is fixed in its center, rising three or four feet high, and furnished at the top with a bowl or funnel. This tube and disk are supported upon a surface of mercury contained in a shallow tub of larger diameter than the disk, a frame-work being attached to the tub for this purpose. A pulley is fixed upon the hollow shaft, so that a belt may be attached for causing the disk to rotate upon the mercury. The sands are fed with water into the funnel at the top of the tube, and the pressure caused by the height of the column carries them down upon the mercurial surface, and, by reason of this pressure and the centrifugal action of the revolving disk, they gradually work outward between this sur-

face and the amalgamated surface above, being pressed and rubbed between them till they escape round the circumference of the disk, and flow over the edge of the tub. Hot water, as in all other modes of amalgamating, is preferable to cold. By this process all free gold, however fine the particles, must come in contact with the amalgamated surface, and be taken up by the mercury. It perfectly separates the gold that in other machines floats off in the fine slime. In gold ores, especially those of sulphurous character, much of the gold is so fine that it remains suspended a long time in water, and is entirely lost. The important feature of this invention is the use of an inferior amalgamated surface, against which these floating particles are pressed. The pressure is secured by any desired depth of the mercury, but in practice less than an inch above the lower edge of the plate is found to be sufficient. The efficiency of the machine was fully tested in November, 1860, at the Gold Hill mine, in North Carolina, where good results were obtained with it. In the same month it was tried at the U. S. assay office, N. Y., upon the tailings of the sweeps from which all the gold had been extracted that could be removed by the amalgamating machines in use, and from these it readily separated the remaining portion.

As remarked in the mention made of the Gold Hill mines, when gold is associated with iron and copper pyrites it is held very tenaciously, as if combined itself with the sulphur, like the other metals. However finely such ores are pulverized, every microscopic particle of pyrites appears to retain a portion of gold, and prevent its uniting with the mercury. This portion of the gold, consequently, escapes in the tailings; and if these are kept in refuse heaps, exposed to the weather, the pyrites slowly decompose, and more gold is continually set free. Thus it is the heaps may be washed over with profit for many successive years. Roasting of the ores is recommended by high authorities for freeing the gold at once, the effect of it being to break up the sulphurets, causing the sulphur to escape in vapor, and the iron to crumble down in the state of an oxide, or an ochreous powder, from which the gold is readily separated. This is objected to by others, who assert that it involves a great loss of gold, which is volatilized or carried off mechanically in the sulphur fumes. Two other methods adopted, since 1857, for the



MARRIAGE CEREMONY IN CHINA.

reduction of those ores containing large proportions of the sulphurets of iron and copper, deserve notice—viz., the “Sodium Amalgamating Process,” and the “Plattner Chlorination Process.”

The use of the Sodium in mechanical combination with mercury to oxidize and thus remove more readily the impurities, sulphur, arsenic, and antimony, which interfere with the reduction or extraction of gold from the quartz, was suggested about 1861, and has been made the subject of two patents, one by Dr. Chas. Wurtz in New York, in 1864, the other by Mr. Crookes, of London, in 1865. It has proved very successful in Colorado, Nova Scotia, and California, in those mines where the gold was so difficult of extraction, on account of the presence of a large percentage of refractory pyrites. The yield of gold from these ores has been increased from 20 to 30 per cent. The sodium is however as yet so costly, that it is only the richer ores in which it pays, commercially, to use it. Amalgams are now put up according to the formulæ of the patentees, containing the requisite quantity of sodium in combination with other metallic compounds. These are to be used, according to the amount of concentration, with from 20 to 150 times their weight of mercury. The Amalgam varies from \$1.25 to \$1.75 per pound. Recently it has been announced that cyanide of potassium was to be preferred for this purpose to sodium—while it is much cheaper. The Plattner chlorination process requires as a preliminary a double roasting of the ores, the first time at a low heat to oxidize the ore and burn out, as far as possible, the sulphurets and other impurities, and the second time, at a higher heat, to decompose the metallic salts formed at the first roasting. If sulphates of lime and magnesia are present they are removed by the addition of some common salt to the roasting mass. When the roasting is completed the ore is discharged from the furnace and allowed to cool, and then being damped is sifted into a large vat, lined with bitumen, and having a false bottom on which rests a filter composed of broken quartz and sand. The vat is provided with a close-fitting cover which can be luted on and made air-tight. The chlorine is then generated in a leaden vessel by means of sulphuric acid, and conducted into the bottom of the vat through a leaden pipe. As it passes up through the ore more ore is

sifted in and the vat is gradually thoroughly charged with the gas, when the cover, having been luted on and all escape prevented, and the whole allowed to stand for twelve or eighteen hours the gold is completely chloridized. Water is then introduced which absorbs the chlorine and dissolves the chloride of gold, and a stream of water is permitted to run in at the top of the vat till the lixiviation is complete. The residue in the vat is then thrown away, and the solution of chloride of gold goes to the precipitating vat when a solution of proto-sulphate of iron is added to it, and it is permitted to stand for eight or ten hours. The water is then carefully drawn off, the precipitated gold collected upon a paper filter, dried, melted and run into bars. This gold will be, if the process is carefully conducted, 999 fine, or almost absolutely pure gold.

In the “branch mining” of the southern states, deposits worked by the rocker are regarded as profitable which pay a pennyweight or nearly one dollar per day to the hand employed. The great beds of decomposed slates of Georgia can be worked to profit when they yield from four to five cents worth of gold to the bushel of stuff, or about 100 lbs. weight; but the mill for crushing and washing it must then be close at hand. The proportion of the gold, in this case, is less than 2 parts in 1,000,000. The hard quartz ores must contain nearly or quite 20 cents worth of gold in the bushel, especially if they are pyritiferous.

Although the gold is obtained in a metallic state, it differs very much in value in different localities. Deposit gold from the vicinity of Dahlonega, in Georgia, is worth 93 cents the pennyweight; that of Hart county, in the same state, 98 cents; of Carroll county, Georgia, and Chesterfield district, South Carolina, \$1.02; of Union county, Georgia, or the Tennessee line, 72 cents; Charlotte, North Carolina \$1.00; and that of Burke county, North Carolina, only 50 cents. The average fineness of California gold is found to be from 875 to 885 parts in 1,000, which is very near that of our gold coin, viz, 900 in 1,000. The native gold from Australia has from 960 to 966 parts in 1,000 pure gold, and some from the Chaudière, in Canada, 877.3 pure gold, and 122.3 silver; another specimen 892.4, silver 107.6. The specific gravity of the metal has been increased by casting from 14.6 in the native state to 17.48.

1.—MINT OF THE UNITED STATES, PHILADELPHIA.

Period.	Virginia.	North Carolina.	South Carolina.	Georgia.	Tennessee.	Alabama.	New Mexico.	California.	Oregon.	Kansas.	Other sources.	Total.
1804 to 1827..	..	\$110,000 00	..	..	..	..	..	..	..	..	..	\$110,000 00
1828 to 1837..	\$427,000 00	2,519,500 00	\$327,500 00	\$1,763,900 00	\$12,400 00	..	..	..	..	..	..	5,063,500 00
1838 to 1847..	518,294 00	1,303,636 00	152,368 00	566,316 00	16,499 00	\$45,493 00	..	..	..	..	\$13,200 00	2,623,641 00
1848.....	57,886 00	109,034 00	19,228 00	3,370 00	3,497 00	3,670 00	..	..	..	..	21,037 00	241,544 00
1849.....	129,382 00	102,688 00	4,309 00	10,525 00	2,739 00	2,977 00	32,889 00	\$44,177 00	..	..	..	5,481,439 00
1850.....	65,991 00	43,734 00	759 00	5,114 00	307 00	1,178 00	5,392 00	31,667,505 00	..	..	144 00	5,767,092 00
1851.....	69,052 00	49,440 00	12,338 00	2,490 00	126 00	817 00	890 00	46,339,367 00	..	..	326 00	31,790,306 00
1852.....	83,626 00	65,248 00	4,505 00	3,420 00	..	254 00	..	49,663,623 00	..	..	..	49,821,490 00
1853.....	52,200 00	45,690 00	3,522 00	1,912 00	..	..	3,632 00	52,732,227 00	13,535 00	..	5,213 00	52,857,931 00
1854.....	23,347 00	9,062 00	1,220 00	7,501 00	..	245 00	738 00	35,671,185 00	..	..	..	35,713,358 00
1855.....	28,895 50	22,626 00	1,200 00	1,733 50	..	310 00	900 00	2,634,297 63	..	..	1,535 00	2,691,497 63
1856.....	21,607 00	12,910 00	5,980 00	4,910 00	..	..	2,460 00	1,440,134 58	40,750 00	..	..	1,528,751 58
1857.....	2,505 00	6,805 00	2,565 00	3,542 00	..	..	..	565,566 41	..	..	..	580,983 41
1858.....	18,377 00	15,175 00	300 00	18,365 00	..	..	..	1,372,506 07	3,600 00	..	..	1,428,323 07
1859.....	15,720 00	9,305 00	4,675 00	20,190 00	240 00	..	275 00	959,191 79	2,960 00	\$145 00	..	1,012,701 79
Total.....	\$1,513,882 50	4,424,853 00	540,467 00	2,413,348 50	35,808 00	54,944 00	48,672 00	229,171,219 48	60,845 145	41,455 00	..	238,305,639 48

Period.	California.	Period.	California.
1854.....	\$10,842,281 23	1856.....	29,209,218 24
1855.....	20,860,437 20	1857.....	12,526,826 93
Total.....	\$106,641,697 73	1859.....	14,098,564 14

Period.	North Carolina.	South Carolina.	Georgia.	Tennessee.	Alabama.	California.	Other sources.	Total.
1838 to 1847.....	\$741 00	\$14,306 00	\$37,354 00	\$1,772 00	\$61,903 00	..	\$3,613 00	\$119,639 00
1848.....	..	1,488 00	2,317 00	947 00	6,717 00	\$1,124 00	..	12,593 00
1849.....	..	423 00	..	..	4,062 00	669,921 00	2,733 00	677,189 00
1850.....	..	..	..	..	3,560 00	4,575,516 00	894 00	4,580,030 00
1851.....	..	..	..	..	..	8,764,682 00	..	8,770,772 00
1852.....	..	..	..	..	1,040 00	3,777,784 00	..	3,777,784 00
1853.....	..	..	..	..	..	2,006,673 00	..	2,006,673 00
1854.....	..	..	..	..	..	981,511 00	..	981,511 00
1855.....	..	..	..	..	..	411,517 24	..	411,517 24
1856.....	..	..	..	..	..	283,344 91	..	283,344 91
1857.....	..	..	..	..	..	129,328 39	..	129,328 39
1858.....	..	..	1,560 00	164 12	..	448,439 84	..	450,163 96
1859.....	..	..	..	..	..	93,272 41	..	93,272 41
Total.....	\$741 00	16,217 00	41,241 00	2,883 12	77,282 00	22,148,173 79	7,290 00	22,293,827 91

2.—BRANCH MINT, SAN FRANCISCO.

Period.	California.	Period.	California.
1854.....	\$10,842,281 23	1856.....	29,209,218 24
1855.....	20,860,437 20	1857.....	12,526,826 93

3.—BRANCH MINT, NEW ORLEANS.

Period.	North Carolina.	South Carolina.	Georgia.	Tennessee.	Alabama.
1838 to 1847.....	\$741 00	\$14,306 00	\$37,354 00	\$1,772 00	\$61,903 00
1848.....	..	1,488 00	2,317 00	947 00	6,717 00
1849.....	..	423 00	..	..	4,062 00
1850.....	..	..	..	..	3,560 00
1851.....	..	..	..	..	..
1852.....	..	..	..	..	1,040 00
1853.....	..	..	..	..	..
1854.....	..	..	..	..	..
1855.....	..	..	..	..	..
1856.....	..	..	..	..	..
1857.....	..	..	..	..	..
1858.....	..	..	1,560 00	164 12	..
1859.....	..	..	..	..	..

4. BRANCH MINT, CHARLOTTE, NORTH CAROLINA.

Period.	N. Carolina.	S. Carolina.	California.	Total.	Period.	N. Carolina.	S. Carolina.	California.	Total.
1838 to 1847....	\$1,529,777 00	\$143,941 00	..	\$1,673,718 00	1854.....	\$188,277 00	\$19,006 00	\$6,328 00	\$213,606 00
1848.....	359,075 00	11,710 00	..	370,785 00	1855.....	196,894 03	14,277 17	6,817 66	216,988 86
1849.....	378,223 00	12,509 00	..	390,732 00	1856.....	157,355 18	..	16,237 35	173,592 53
1850.....	307,289 00	13,000 00	..	320,289 00	1857.....	170,560 33	5,807 16	..	176,067 49
1851.....	275,742 00	25,478 00	..	301,220 00	1858.....	75,376 47	..	..	75,376 47
1852.....	337,604 00	64,934 00	..	402,538 00	1859.....	182,489 61	22,762 71	..	205,252 32
1853.....	227,847 00	61,845 00	..	289,692 00					
Total.....	\$1,529,777 00	\$143,941 00	..	\$1,673,718 00		\$4,386,239 62	\$394,965 04	\$87,321 01	\$4,868,525 67

5. BRANCH MINT, DAHLONEGA, GEORGIA.

Period.	N. Carolina.	S. Carolina.	Georgia.	Tennessee.	Alabama.	California.	Kansas.	Other sources.	Total.
1838 to 1847....	\$54,331 00	\$85,427 00	\$2,475,353 00	\$32,175 00	\$41,711 00	..	..	..	\$218,017 00
1848.....	5,434 00	8,151 00	251,376 00	2,717 00	4,075 00	..	..	..	271,753 00
1849.....	4,882 00	5,700 00	225,824 00	2,441 00	8,661 00	..	..	..	244,131 00
1850.....	4,500 00	5,700 00	204,473 00	1,900 00	1,800 00	..	..	..	247,498 00
1851.....	1,971 00	3,236 00	154,723 00	2,251 00	2,105 00	..	..	..	879,809 00
1852.....	1,433 00	57,543 00	93,122 00	150 00	..	\$30,0 5 00	..	\$951 00	476,759 00
1853.....	2,085 00	83,950 00	56,984 00	740 00	..	859,122 00	..	..	432,290 00
1854.....	5,818 00	15,988 00	47,027 00	223 00	277 92	271,169 40	..	..	280,225 00
1855.....	8,145 82	9,113 27	56,656 36	..	..	47,428 70	..	..	116,652 07
1856.....	..	25,733 75	44,101 99	106 42	..	81,467 10	..	..	101,405 26
1857.....	..	8,083 89	25,097 68	107 83	..	6,498 42	..	..	38,619 54
1858.....	..	32,322 28	57,591 43	..	..	5,293 32	..	..	95,014 58
1859.....	2,656 83	4,910 35	57,023 12	..	..	6,699 19	\$82 70	..	65,012 24
Total.....	\$95,256 70	\$307,171 54	\$4,252,689 55	\$42,119 75	\$39,629 92	\$1,230,705 63	\$82 70	\$861 00	\$5,985,685 69

6. ASSAY OFFICE, NEW YORK.

Period.	Virginia.	N. Carolina.	S. Carolina.	Georgia.	Alabama.	California.	Kansas.	Oregon.	Other sources.	Total.
1854.....	\$2,916 00	\$2,916 00	\$395 00	\$1,242 00	..	\$9,221 457 00	..	..	..	\$9,221 457 00
1855.....	2,370 00	3,750 00	7,630 00	13,100 00	\$350 00	25,025 806 11	..	..	\$1,600 00	\$2,027,117 00
1856.....	6,928 00	8,005 07	4,052 29	41,101 98	223 62	16,250 008 90	..	..	..	\$2,040,686 11
1857.....	1,831 00	1,689 00	2,663 00	10,451 00	1,545 00	9,590,937 00	..	..	..	16,582,129 16
1858.....	501 00	7,007 00	6,354 00	12,951 00	2,181 00	19,600,551 48	..	\$5,581 00	27,523 00	9,917,886 00
1859.....	436 00	20,122 00	700 00	14,756 00	593 00	11,694,872 25	\$3,944 00	2,866 00	405 00	19,722,619 46
Total.....	\$11,933 00	\$37,289 07	\$21,784 29	\$93,001 28	\$4,902 62	\$92,031,722 72	\$3,944 00	\$3,447 00	\$29,658 00	\$92,243,151 95

7. SUMMARY EXHIBIT OF THE ENTIRE DEPOSITS OF DOMESTIC GOLD AT THE UNITED STATES MINT AND BRANCHES, TO JUNE 30, 1859.

Mints.	Virginia.	N. Carolina.	S. Carolina.	Georgia.	Alabama.	New Mexico.	California.	Kansas.	Oregon.	Other sources.	Total.
Philadelphia.....	\$1,513,952 50	\$4,424,833 00	\$540,407 00	\$2,413,343 50	\$54,944 00	\$45,672 00	\$229,171,219 48	\$145 00	\$60,845 00	\$41,455 00	\$238,305,689 48
San Francisco.....	..	..	..	..	..	..	106,641,697 73	..	..	..	106,640,697 73
New Orleans.....	..	741 00	16,217 00	41,241 00	2,853 12	77,252 00	22,148,173 79	..	..	7,290 00	22,208,877 91
Charlotte.....	..	4,386,239 62	894,965 04	..	..	..	87,221 01	..	..	..	4,868,525 67
Dahlonega.....	..	95,286 70	807,171 54	4,292,888 55	42,119 75	59,629 92	1,290,705 53	82 70	..	951 00	5,985,635 69
Assay Office.....	11,933 00	37,289 07	21,784 29	93,001 28	4,902 62	..	92,031,722 72	3,944 00	8,447 00	29,625 00	92,243,151 90
Total.....	\$1,625,615 60	\$5,044,409 29	\$1,250,704 57	\$6,800,679 33	\$80,810 87	\$48,672 00	\$451,810,404 26	\$4,171 70	\$69,292 00	\$79,324 00	\$470,404,478 46

The most important use of gold is as a medium of exchange. For this purpose it is converted into coin at the mints, and into bars or bullion at the government assay office. In this form a large portion of the receipts from California is immediately exported from New York to make up the balance of foreign trade. Each bar is stamped with marks, representing its fineness and weight, and may continue to be thus used, or when received at foreign mints, is converted into coin. A large amount of gold is consumed in jewelry, trinkets, watches, and plate, and still more in the form of gold-leaf. This last being worn out in the using, or being distributed in too small quantities together to pay for recovering it, is altogether lost to the community, after the articles have served the purpose intended. This loss in the time of James I. was considered so serious, that a special act was passed, restricting the use of gold and silver-leaf, except for specified objects, which, singularly enough, were chiefly for military accoutrements. Gold employed in the recently invented process of electrotyping, in which large quantities are consumed, is similarly lost in the using.

Besides the use of gold-leaf in gilding, it is employed quite largely by dentists as the best material for filling teeth. They also use much gold plate and wire for securing the artificial sets in the mouth. In book-binding, gold is consumed to considerable extent for lettering and ornamenting the backs of the books. The manufacture of gold-leaf is carried on in various places, both in the cities and country. It is a simple process, known in ancient times, but only of late years carried to a high degree of perfection. The ingots, moulded for the purpose, and annealed in hot ashes, are rolled between rollers of polished steel, until the sheet is reduced from its original thickness of half an inch to a little more than $\frac{1}{16}$ of an inch, an ounce weight making a strip ten feet long and $1\frac{1}{2}$ inches wide. This is annealed and cut into pieces an inch square, each weighing about six grains. A pile is then made of 150 of these pieces, alternating with leaves of fine calf-skin vellum, each one of which is four inches square, and a number of extra leaves of the vellum are added at the top and bottom of the pile. The heap, called a tool or kutch, is slipped into a parchment case open at the two ends, and this into a similar one, so that each side of

the pack is protected by one of the case. It is placed upon a block of marble, and then beaten with a hammer weighing sixteen pounds, and furnished with a convex face, the effect of which is to cause the gold to spread more rapidly. The workman wields this with great dexterity, shifting it from one hand to the other, without interfering with the regularity of the blow. The pack is occasionally turned over, and is bent and rolled in the hands to cause the gold to extend freely between the leaves, as it is expanded. The gold-leaves are also interchanged to expose them all equally to the beating. When they have attained the full size of the vellum, which is done in about twenty minutes, they are taken apart, and cut each one into four pieces, making 600 of the original 150. These are packed in gold-beater's skin, and the pack is beaten as before, but with a lighter hammer, until they are extended again to sixteen square inches. This occupies about two hours. The gold-leaves are then taken out, and spread singly upon a leather cushion, where they are cut into four squares by two sharp edges of cane, arranged in the form of a cross. To any other kind of a knife the gold would adhere. These leaves are again packed, 800 together, in the finest kind of gold-beater's skin, and expanded till each leaf is from 3 to $3\frac{1}{2}$ inches square. The aggregate surface is about 192 times larger than that of the original sheet, and the thickness is reduced to about the $\frac{1}{153600}$ of an inch. The beating is sometimes carried further than this, especially by the French, so that an ounce of gold is extended over 160 square feet, and its thickness is reduced to $\frac{1}{256000}$ of an inch, or even to $\frac{1}{250000}$. When the pack is opened, the leaves are carefully lifted by a pair of wooden pliers, spread upon a leather cushion by the aid of the breath, and cut into four squares of about $3\frac{1}{4}$ inches each, which are immediately transferred one by one between the leaves of a little book of smooth paper, which are prevented from adhering to the gold-leaves by an application of red ochre or red chalk. Twenty-five leaves are put into each book, and when filled, it is pressed hard, and all projecting edges of the gold are wiped away with a bit of linen. The books are then put up in packages of a dozen together for sale.

An imitation gold-leaf, called Dutch gold-leaf, is used to some extent. It is prepared from sheets of brass, which are gilded, and

beaten down in the manner already described. When new it appears like genuine gold-leaf, but soon becomes tarnished in use. Party gold-leaf is formed of leaves of gold and of silver, laid together and made to unite by beating and hammering. It is then beaten down like gold-leaf.

The gold-beater's skin used in this manufacture is a peculiar preparation made from the *cæcum* of the ox. The membrane is doubled together, the two mucous surfaces face to face, in which state they unite firmly. It is then treated with preparations of alum, isinglass, whites of eggs, etc., sometimes with creosote, and after being beaten between folds of paper to expel the grease, is pressed and dried. In this way leaves are obtained $5\frac{1}{2}$ inches square, of which moulds are made up, containing each 850 leaves. After being used for a considerable time, the leaves become dry and stiff, so that the gold cannot spread freely between them. To remedy this, they are moistened with wine or with vinegar and water, laid between parchment, and thoroughly beaten. They are then dusted over with calcined selenite or gypsum, reduced to a fine powder. The vellum, which is used before the gold-beater's skin, is selected from the finest varieties, and this, too, after being well washed and dried under a press, is brushed over with pulverized gypsum.

In the great exhibition at London in 1851, machines were exhibited from the United States, and also from Paris, which were designed for gold-beating, and it was supposed they would take the place of the hand process. They have been put into operation at Hartford, in Connecticut, but after being tried, they have been laid aside for the old method.

CHAPTER IV.

LEAD.

LEAD is met with in a great number of combinations, and has also been found in small quantity, at a few localities in Europe, in a native state. The common ore, from which nearly all the lead of commerce is obtained, is the sulphuret, called galena, a combination of 86.55 per cent. of lead and 13.45 of sulphur. It is a steel gray mineral of brilliant metallic lustre when freshly broken, and is often obtained in large cubical crystals; the

fragments of these are all in cubical forms. The ore is also sometimes in masses of granular structure. Very frequently galena contains silver in the form of sulphuret of that metal, and gold, too, has often been detected in it. The quantity of silver is estimated by the number of ounces to the ton, and this may amount to 100 or 200, or even more; but when lead contains three ounces of silver to the ton this may be profitably separated. Ores of this character are known as argentiferous galena; if the silver is more valuable than the lead they are more properly called silver ores. In Mexico and Germany such are worked, but not in the United States. Galena is easily melted, and in contact with charcoal the sulphur is expelled and the lead obtained. The ore is found in veins in rocks of different geological formations, as in the metamorphic rocks of New England, the lower silurian rocks of Iowa, Wisconsin, and Missouri, in limestones and sandstones of later age in New York and the middle states, belonging to higher groups of the Appalachian system of rocks, and in the new red sandstone of Pennsylvania at its contact with the gneiss.

Carbonate of lead is another ore often associated with galena, though usually in small quantity. It is of light color, whitish or grayish, commonly crystallized, and in an impure form is sometimes obtained in an earthy powder. At St. Lawrence county, New York, large quantities of it have been collected for smelting, and were called lead ashes. The ore may escape notice from its unmetallic appearance, and at the Missouri mines large quantities were formerly thrown aside as worthless. It contains 77.5 per cent. of lead combined with 6 per cent. of oxygen, and this compound with 16.5 per cent. of carbonic acid. Beautiful crystals of the ore, some transparent, have been obtained at the mines on the Schuylkill, near Phoenixville, Pennsylvania; the Washington mine, Davidson county, North Carolina; and Mine La Motte, Missouri.

Another ore, the phosphate or pyromorphite, has been known only as a rare mineral until it was produced at the Phoenixville mines so abundantly as to constitute much the larger portion of the ores smelted. It is obtained in masses of small crystals of a green color, and sometimes of other shades, as yellow, orange, brown, etc., derived from the minute portions of chrome in combination. With these a variety of other compounds of

lead are mixed, together with phosphate of lime and fluoride of calcium, so that the percentage of the metal is variable. The compounds of lead met with at these mines are the sulphuret, sulphate, carbonate, phosphate, arseniate, molybdate, chromate, chromo-molybdate, arsenio-phosphate, and antimonial argentiferous. Besides all these, a single vein contained native silver, native copper, and native sulphur, three compounds of zinc, four of copper, four of iron, black oxide of manganese, sulphate of barytes, and quartz.

The eastern portion of the United States is supplied with lead almost exclusively from Spain and Great Britain, but the western states are furnished with this metal from mines in Iowa, Wisconsin, and Missouri. The lead veins of the eastern and southern states are of little importance. In Maine the ores are found in Cobscook Bay, near Lubec and Eastport, in limestone rocks near dikes of trap. A mine was opened in 1832, and a drift was carried in about 155 feet at the base of a rocky cliff on the course of the vein; it was then abandoned, but operations have recently been recommenced. In New Hampshire argentiferous galena is found in numerous places, but always in too small quantity to pay the expenses of extraction. At Shelburne a large quartz vein was worked from 1846 to 1849, and three shafts were sunk, one of them 275 feet in depth. The ore was found in bunches and narrow streaks, but in small quantity. Some of it was smelted on the spot, and five tons were shipped to England, which sold for £16 per ton. The richest yielded 84 ounces of silver to the ton. Another vein of argentiferous galena has been partially explored at Eaton, and this is most likely of any to prove valuable.

Massachusetts, also, contains a number of lead veins, none of which have proved profitable, though some of them have been worked to considerable extent. The most noted are those of Southampton and Easthampton. Operations were commenced at the former place in 1765 upon a great lode of quartz containing galena, blende, copper pyrites, and sulphate of barytes. It is in a coarse granitic rock near its contact with the red sandstone of the Connecticut valley. About the year 1810 an adit level was boldly laid out to be driven in from 1,100 to 1,200 feet, to intersect the vein at 140 feet below the surface. A single miner is said to have worked at it till his death, in 1828, when it had reached the length of 900 feet.

At different times this adit has been pushed on, and when last abandoned, in 1854, it was supposed to be within a few feet of the vein. The rock was so excessively hard that the cost of driving the adit was about \$25 per foot. Lead veins are found in Whately, Hatfield, and other towns in Hampshire county.

In Connecticut, also, several veins have been worked to some extent. That at Middletown, referred to in the introductory remarks as one of the earliest opened mines in the United States, is the most noticeable. It is unknown when this mine was first worked. In 1852 operations were renewed upon it, and a shaft sunk 120 feet below the old workings. The vein is among strata of a silicious slate, in some places quite rich, but on the whole it has proved too poor to work. The ore contained silver to the value of from \$25 to \$75 to the ton of lead.

Lead mines have been opened in New York, in Dutchess, Columbia, Washington, Rensselaer, Ulster, and St. Lawrence counties. In the first four of these the ore is found in veins near the junction of the metamorphic slates and limestones. The Ancram or Livingston mine, in Columbia county, has been worked at different times at considerable expense, but with no returns. A mine in Northeast, Dutchess county, was first opened by some German miners in 1740, and ore from it was exported. The Committee of Public Safety, during the revolutionary war, sought to obtain supplies of lead from it. The lead veins of this part of New York have attracted more interest, on account of their highly argentiferous character, than the quantity of ore they promise would justify; but it seems to be almost universally the case throughout the United States that the galena yielding much silver fails in quantity. The Ulster county mines are found on the west side of the Shawangunk mountain in the strata of hard grit rock which cover its western slope. At different places along this ridge veins have been found cutting across the strata in nearly vertical lines, and have produced some lead, zinc, and copper. The Montgomery mine, near Wurtsboro, in Sullivan county, was chiefly productive in zinc. Near Ellenville, Ulster county, several veins have been followed into the mountain, and one of these, which was worked in 1853, afforded for a short time considerable quantities of rich lead and copper ores. From the former there were smelted about 459,000 pounds of lead, and the sales of the latter

amounted to from 60 to 70 tons, of which 50 tons yielded 24.3 per cent. of copper. Where the vein was productive it contained the rich ores unmixed with stony gangues, and sometimes presenting a thickness of five feet of pure ore; where it became poor it closed in sometimes to a mere crack in the grit rock, and then the expense of extending the workings became very great from the extreme hardness of this rock. Open fissures were met with, one of which was more than 100 feet long and deep, and in places 12 feet or more wide. It was partially filled with tough yellow clay, through which were dispersed fragments of sandstone, magnificent bunches of quartz crystals, and lumps of lead and copper ores. The walls on the sides also presented a lining in places of the same ores. A drift was run into the base of the mountain about 200 feet, and a shaft was sunk at the foot of the slope about 100 feet. The expense of working in the hard rock proved to be too great for the amount of ore obtained, and the mine was abandoned in 1854, although its production, for the extent of ground opened, has been exceeded by but few other mines in the eastern states. The most promising veins in the state are those of St. Lawrence county in the vicinity of Rossie. They occur in gneiss rock, which they cut in nearly vertical lines. One of these was opened along the summit of Coal Hill, and was worked in 1837 and 1838 by an open cut of 440 feet in length, to the depth, in some places, of 180 feet. In 1839 the mine was abandoned, after the company had realized about \$241,000 by the sale of some 1,800 tons of lead they had extracted. The galena was remarkably free from blende, and from pyritous iron and copper, which (especially the first-named) are so often associated with the ore, rendering it difficult to smelt. Calcareous spar, often finely crystallized, formed the gangue of the vein. A nearly transparent crystal, weighing 165 lbs., is preserved in the cabinet of Yale College. Other attempts have been made to work the mine; and the cause of its being allowed to lie idle appears to be the difficulty of negotiating a mining right with the proprietors.

In Pennsylvania the most productive lead mines are those of Montgomery and Chester counties, found in a small district of 5 or 6 miles in length by 2 or 3 in width, at the line of contact of the gneiss, and red shale and sandstone. About 12 parallel veins have been discovered, extending north 32°

to 35° east, and dipping steeply south-east. In the gneiss they are productive in lead ores, and in the red shale in copper. The gneiss is decomposed, and the vein itself is in considerable part ochreous and earthy, owing to decomposition of pyritous ores. In this material, called by the miners gossan, silver has been discovered amounting to 10 ounces to the ton. The two principal mines of this group are the Wheatley and the Chester County. The former was opened in 1851, and up to September, 1854, had produced 1,800 tons of ore, principally phosphate, estimated to yield 60 per cent. of metal. In this vein the great number of varieties of lead and other ores enumerated above were met with. The Chester County Mining Company commenced operations in 1850, and up to November, 1851, had raised and smelted 190,400 lbs. of ore, almost exclusively phosphate, which produced about 47 per cent. of lead. The silver in this ore amounted to about 1.6 ounce in 2,000 lbs.; in the galena associated with it the silver was found in quantities varying from 11.9 to 16.2 ounces; the coarser grained galena giving the most, and the fine grained the least. In connection with the furnaces for smelting the ores, was one for separating the silver by cupellation, and a considerable amount of silver was obtained before the mining operations were abandoned, in 1854.

Lead ores are found along the Blue Ridge, in Virginia, and at one point, near the central portion of its range across the state, a mine has been worked for a number of years. They are also met with in several of the gold mines, but not in workable quantities. In south-west Virginia and east Tennessee the ores are found in the silurian limestones, and a considerable number of mines have been worked to moderate extent in both states. The most important one is the Wythe lead mine, 16 miles from Wytheville, which was worked in 1754. It is in a steep hill on the border of New River, a fall upon which, near the mine, affords power for raising the water required in dressing the ores, and also for producing the blast for the furnace. Several shafts have been sunk, one of which extending down to the adit—a depth of 225 feet—is used as a shot tower. The ores are galena, with more or less carbonates intermixed. The product for 1855 is stated to have been 500 tons of lead. The transportation of lead, in pigs, bars, and shot, from the south-west part of Virginia toward the east, by the

Virginia and Tennessee railroad, for the years named, has been as follows:—

	1856. lbs.	1857. lbs.	1858. lbs.	1859. lbs.
Pig Lead	409,649	514,878	163,405	654,685
Bar Lead		234,087	52,230	12,580
Shot.....	364,660	120,142	104,623	254,970
Total.....	774,309	869,057	320,258	1,132,245

In the other direction the transportation of the same articles was comparatively unimportant.

South of Virginia the only lead mine of importance is the Washington mine, Davidson county, N. C. This was opened in 1836, in the silicious and talcose slates of the gold region, and was worked for the carbonate of lead, which was found in a dull, heavy ore of earthy appearance, with which were intermixed glassy crystals of the same mineral. Some galena and phosphate of lead were also met with. After a time native silver was detected, and the lead that had been obtained was found to be rich in silver. Till 1844 the mine continued to produce ores containing much silver, and afforded the first deposits of this metal in the mint from domestic mines. The character of the ores changed, however, below the depth of 125 feet, the silver almost disappearing. The actual product of the mine is not known. That of 1844 is said to have been \$24,209 in value of silver, and \$7,253 of gold, obtained from 160,000 lbs. of lead—an average of 240 oz. of auriferous silver to 2,000 lbs. of metal. In 1851 the production was 56,896 lbs. of lead and 7,942.16 oz. of auriferous silver—equal to 279 oz. to the ton of metal. Zinc blende and galena became at last the prevailing ores, the silver varying from 2.5 to 195 oz. to the ton; and the workings were extended upon two parallel veins which lay near each other in the slates. In 1852 mining operations were abandoned as unprofitable, but were soon after renewed, and are still continued.

The great lead mines of the United States are the upper mines, in a district near the Mississippi, in Iowa, the south-west part of Wisconsin, and the north-west part of Illinois; and the lower mines, in Missouri. The existence of lead ores in the upper district was made known by Le Sueur, who discovered them in his voyage up the Mississippi in 1700 and 1701. They attracted no further attention, however, till a French miner, Julien Dubuque, commenced to work them in 1788; and in this employment he continued,

on the spot where now stands the city in Iowa bearing his name, until his death in 1809. When the United States acquired possession of the country in 1807, the mineral lands were reserved from the sales, and leases of mining rights were authorized. These were not, however, issued until 1822, and little mining was done before 1826. From that time the production of lead rapidly increased; and the government for a time received the regular rates for the leases. But after 1834 the miners and smelters refused to pay them any longer, on account of so many sales having been made and patents granted of mineral lands in Wisconsin. In 1839 the United States government authorized a geological survey of the lead region, in order to designate precisely the mineral tracts, and this was accomplished the same year by Dr. D. D. Owen, with the aid of 139 assistants. In 1844 it was decided to abandon the leasing system, and throw all the lands into the market. The lead region, according to the report of Dr. Owen, extends over about 62 townships in Wisconsin, 10 in the north-west corner of Illinois, and 8 in Iowa—a territory altogether of about 2,880 square miles. Its western limit is about 12 miles from the Mississippi river; to the north it extends nearly to Wisconsin river; south to Apple river, in Illinois; and east to the east branch of the Pekatonica. From east to west it is 87 miles across, and from north to south 54 miles. Much of the region is a rolling prairie, with a few isolated hills, called mounds, scattered upon its surface, the highest of them rising scarcely more than 200 feet above the general level. The prevailing limestone formations give fertility to the soil, and the country is well watered by numerous small streams, which flow in valleys excavated from 100 to 150 feet below the higher levels. The limestone, of gray and yellowish gray colors, lies in nearly horizontal strata, and the portion which contains the lead veins hardly exceeds 50 feet in thickness. Beneath it is a sandstone of the age of the Potsdam sandstone, and above it are strata of limestone recognized as belonging to the Trenton limestone, so that it proves to be a formation interposed between these, quite western in character, as it is not met with east of Wisconsin. The veins occupy straight vertical fissures, and several near together sometimes extend nearly a mile in an east and west direction. They never reach downward into the sandstone,

but are lost in the lower strata of the limestone, and where the upper strata of the formation appear, these cover over the veins, and are consequently known as the cap-rock. In the fissures or crevices the galena is found, sometimes in loose sheets and lumps embedded in clay and earthy oxide of iron, and sometimes attached to one or both walls. It is rarely so much as a foot thick. No other ores are found with it, except some zinc blende and calamine, and occasionally pyritous iron and copper. The lead contains but a trace of silver. The fissures, as they are followed beneath the surface, sometimes expand in width till they form what is called an "opening;" and the hollow space may go on enlarging till it becomes a cave of several hundred feet in length and 30 or 40 in width. Their dimensions are, however, usually within 40 or 50 feet in length, 4 to 8 in width, and as many in height. The walls of the openings often afford a thick incrustation of galena, besides more or less loose mineral in the clay, among the fragments of rock, with all of which the caves are partially filled. Flat sheets of ore often extend from the vertical fissures between the horizontal limestone strata; these are more apt to contain blende, and pyrites, and calcareous spar than the ore of the vertical crevices. Besides these modes of occurrence, galena is found in loose lumps in the clayey loam of the prairies. This is called float mineral, and is regarded as an evidence of productive fissures in the vicinity.

The galena occurs under a variety of singular forms in the crevices. It lines curious cavities which extend up in the cap-rock, terminating above in a point, and which are known as chimneys. Upon the roofs of the openings it is found in large bunches of cubical crystals, and the same are obtained lying in the clays of the same openings. A flat sheet of the ore was worked in Iowa that was more than 20 feet across and from 2 to 3 feet thick, each side of which turned down in a vertical sheet, gradually diminishing in thickness. It yielded 1,200,000 lbs. of rich galena, and more still remained behind in sight. The crevices near Dubuque are the most regular and productive of any in the district. One called the Langworthy, on a length of about three-fourths of a mile, has produced 10,000,000 lbs. of ore. On the main fissure there were usually three ranges of crevices one above another, widening out to 15 or 20 feet.

The smelters of this region form a distinct class from the miners, of whom the former buy the ores as these are raised, and convert them into metal in the little smelting establishments scattered through the country. The lead has been principally sent down the Mississippi river to Saint Louis and New Orleans; but a portion has always been consumed in the country, and some has been wagoned across to Milwaukee before the construction of railroads, which since 1853 have afforded increased facilities for distributing in different directions the product of the mines. The only records of the amount of lead obtained are those of the shipments down the river. The following table presents the number of pigs shipped from the earlier workings to 1857; the figures for 1841 to 1850, inclusive, being furnished to Dr. Owen's Report of 1852 by Mr. James Carter, of Galena. The pigs weigh about 70 lbs. each.

SHIPMENTS OF LEAD FROM THE UPPER MISSISSIPPI.			
Years.	Pigs.	Years.	Pigs.
1821 to 1823...	4,790	1842.....	447,859
1824.....	2,503	1843.....	561,321
1825.....	9,490	1844.....	624,601
1826.....	13,700	1845.....	778,460
1827.....	74,130	1846.....	730,714
1828.....	158,655	1847.....	771,679
1829.....	190,620	1848.....	680,245
1830.....	119,060	1849.....	628,934
1831.....	91,170	1850.....	569,521
1832.....	61,164	1851.....	474,115
1833.....	113,440	1852.....	408,628
1834.....	113,648	1853.....	425,814
1835.....	158,330	1854.....	423,617
1836.....	191,750	1855.....	430,365
1837.....	219,360	1856.....	435,654
1838.....	200,465	1857.....	485,475
1839.....	357,785	1858.....	
1840.....	317,845	1859.....	
1841.....	452,814		

The lead region of Missouri was first brought into public notice by the explorations of the French adventurer, Renault, who was sent out from Paris in 1720, with a party of miners, to search for precious metals in the territory of Louisiana, under a patent granted by the French government to the famous company of John Law. Their investigations were carried on in the region lying near the Mississippi and south of the Missouri river; and here, though they failed to find the precious metals they were in search of, they discovered and opened many mines of lead ore. A large mining tract in the northern part of Madison county is still called by the name of their mineralogist, La Motte. Their opera-

tions, however, were altogether superficial, and the lead they obtained was wholly by the rude and wasteful process of smelting the ores upon open log-heaps—a practice which even of late years is followed to some extent. Up to Renault's return to France, in 1742, little progress had been made in the development of this mining district. The next step was made by one Moses Austin, of Virginia, who obtained from the Spanish government a grant of land near Potosi, and commenced in 1798 regular mining operations by sinking a shaft. He also started a reverberatory furnace and built a shot tower. Schoolcraft states in his "View of the Lead Mines of Missouri," that there were in 1819 forty-five mines in operation, giving employment to 1,100 persons. Mine à Burton and the Potosi diggings had produced from 1798 to 1816 an annual average amount exceeding 500,000 pounds; and in 1811 the production of Mine Shibboleth was 3,125,000 pounds of lead from 5,000,000 pounds of ore. At a later period, from 1834 to 1837, the several mines of the La Motte tract produced, it is estimated, 1,035,820 pounds of lead per annum. From 1840 to 1854 the total yield of all the mines is stated by Dr. Litton in the state geological report to amount to over 3,833,121 pounds annually. At the close of this period it had, however, greatly fallen off, there being at that time scarcely 200 persons engaged in mining, besides those employed at the three mines known as Perry's, Vallé's, and Skewers'. The principal mines have been in Washington, St. Francis, and other neighboring counties. The ores are found in strata of magnesian limestone of an older date than the galena limestone of Wisconsin, and supposed to lie, with the sandstones with which they alternate, on the same geological horizon as the calciferous sand rock, which is found in the eastern states overlying the Potsdam sandstone. Some of the mines are at the contact of the horizontal limestone with granite rocks, but the ores in this position are only in superficial deposits or in layers included in the limestone. In their general features the veins do not differ greatly from those of the northern mines. Some of them, however, contain a larger proportion of other ores besides galena, as well as a greater variety of them. Carbonate of lead, called by the Miners dry bone and white mineral, is more abundant, and also blende, called by

them black jack, and the silicate of zinc. Iron and copper pyrites are often seen, and at Mine la Motte are found the black oxides of cobalt and manganese associated with the carbonates of lead and copper. Nearly all the mining operations have been mere superficial excavations in the clay, which were soon exhausted of the loose ore and abandoned. But to this there are some remarkable exceptions of deeper and more permanent mines than are known in the northern lead regions. Such are Vallé's and Perry's mines, both situated on the same group of veins, which form a network of fissures and openings running in every direction and spreading over an area of about 1,500 feet in length by 500 in breadth, the extension of which is from north-west to south-east. These mines have been steadily worked since 1824, and 22 shafts have been sunk upon the fissures, six of which are over 110 feet deep, one is 170 feet deep, and only two are less than 50 feet. For the first 10 to 30 feet they pass through gravel and clay, below this through a silicious magnesian limestone of light color, and then enter a very close-grained variety of the same, called by the miners the cast steel rock. A succession of openings are encountered, which are distributed with considerable regularity upon three different levels. Those of the middle series have been the most productive. Sometimes chimneys connect them with the caves of the tier above or below. The portion of these mines on the Vallé tract produced, according to the state report, from 1824 to 1834 about 10,000,000 pounds of lead, and in the succeeding 20 years about as much more; and Perry's mine from 1839 to 1854 has produced about 18,000,000 pounds.

No accurate estimates have been preserved of the total production of the Missouri mines. This has always fallen far short of the yield of the northern mines. From 1832 to 1843 it is reported as running from 2,500 to 3,700 tons per annum, while that of the northern mines in the same time was from 5,500 to 14,000 tons, and in 1845 it even exceeded 24,000 tons. In 1852 Mr. J. D. Whitney estimated that the production in Missouri had fallen to 1,500 tons, or less; and from that period it has probably not advanced. As this decrease in the supply has been going on while the price of lead has risen to nearly three times what it was in 1842, the cause is probably

owing to the mines themselves being in great part exhausted. The only sufficient sources known from which the increasing supplies required from year to year can be furnished, are the mines of Great Britain and Spain, though should the argentiferous lead mines of Mexico ever be worked for the lead as well as the silver they contain, they might furnish large quantities of the

former metal. As the production of the United States fell off that of Great Britain increased from 64,000 tons in 1850 to 73,129 tons in 1856, and 96,266 tons in 1857, thus considerably exceeding one-half of the whole production of the globe in this metal, which in 1854 was rated at about 133,000 tons. At that time the production of Spain was rated at 30,000 tons, and of the United States at 15,000 tons.

Years.	Pig lead from American mines received at St. Louis and New Orleans. lbs.	Pig, bar, and sheet lead imported. lbs.	Invoice value of yearly importations.	Average rate of duty per 100 lbs.	White and red lead imported lbs.	Invoice value of yearly importations.
1832.....	8,540,000	5,333,588	\$124,311	\$3.00	557,781	\$30,791
1833.....	12,600,000	2,282,068	60,660	3.00	625,069	36,049
1834.....	14,140,000	4,997,293	168,811	2.77	1,024,663	57,572
1835.....	16,000,000	1,006,472	35,663	2.77	832,215	50,225
1836.....	18,000,000	919,087	35,283	2.55	908,105	62,237
1837.....	20,000,000	335,772	13,871	2.57	599,980	47,316
1838.....	20,860,000	165,844	6,573	2.34	522,681	38,683
1839.....	24,000,000	528,922	18,631	2.31	720,408	50,905
1840.....	27,000,000	519,343	18,111	2.08	643,418	41,043
1841.....	30,000,000	62,246	2,605	2.07	532,122	31,617
1842.....	33,110,000	4,689	155	3.00	479,738	28,747
1843.....	39,970,000	290	3	3.00	93,166	5,600
1844.....	44,730,000	..	..	3.00	..	..
1845.....	51,240,000	19,609	458	3.00	231,171	14,744
1846.....	54,950,000	214	6	3.00	215,434	15,685
1847.....	46,130,000	224,905	6,288	0.56	298,387	15,228
1848.....	42,420,000	2,684,700	85,387	0.64	318,781	19,703
1849.....	35,560,000	..	..	..	..	..
1850.....	40,313,910	36,997,751	1,182,597	0.64	853,463	43,756
1851.....	34,934,480	43,470,210	1,517,603	0.70	1,105,852	52,631
1852.....	28,593,180	37,544,588	1,283,331	0.70	842,521	43,365
1853.....	31,497,950	43,174,447	1,618,058	0.70	1,224,068	69,058
1854.....	21,472,990	47,714,140	2,095,039	0.90	1,865,893	102,812
1855.....	21,441,140	56,745,247	2,556,523	0.90	2,319,099	134,855
1856.....	15,347,880	55,294,256	2,528,014	0.91	3,548,409	174,125
1857.....	14,028,140	47,947,698	2,305,768	0.72	1,793,377	113,075
1858.....	21,210,420	41,230,019	1,972,243	0.72	1,785,851	109,426
1859.....	23,442,870	64,000,000	2,617,770	0.72	61,936	3,871
1860.....	22,683,125	45,896,700	1,835,868	0.72	177,744	11,109
1861.....	21,554,743	45,654,100	1,826,164	0.72	200,848	12,553
1862.....	20,370,188	34,611,575	1,384,463	0.78	307,824	19,239
1863.....	22,798,142	39,437,566	2,816,969	1.11	1,004,624	71,766
1864.....	18,141,878	20,897,109	2,247,001	1.32	1,390,052	149,468
1865.....	18,266,313	7,969,080	1,195,362	1.75	1,662,516	249,385
1866.....	23,393,450	40,223,888	2,513,993	2.25	2,035,395	135,693
1867.....	26,301,357	41,065,175	2,737,745	0.96	1,464,972	122,081
1868.....	30,014,759	41,437,520	2,762,520	1.00	1,399,512	116,626
1869.....	33,717,830	56,062,128	3,503,883	0.97	336,732	28,061
1870.....	37,136,742	58,310,464	3,644,404	0.96	367,008	30,584

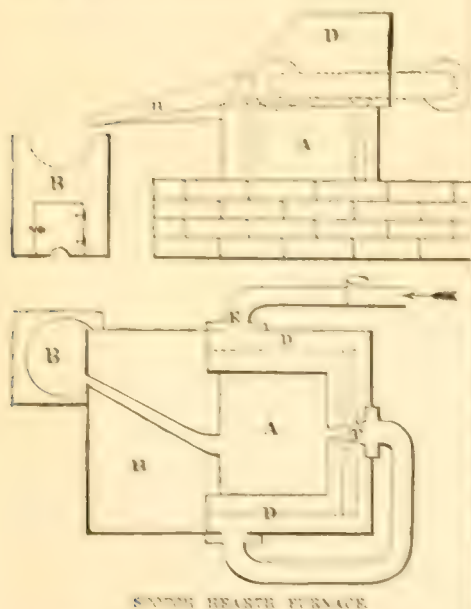
For the year ending June 30, 1859, the imports of lead are given at 64,000,000 pounds, worth nearly \$2,700,000. Of this about \$57,000 worth were re-exported to foreign countries, besides American lead to the value of \$30,000, and a small amount of manufactured lead.

LEAD SMELTING. The lead mines of the United States being scattered over wide territories, and their products being nowhere brought together in large quantities, the process of reducing the ores has been conducted in small establishments and by the most sim-

ple methods. The earlier operations were limited to smelting the ores in log furnaces. Upon a layer of logs placed in an inclosure of logs or stones piled up, split wood was set on end and covered with the ore, and over this small wood again. The pile was fired through an opening in front. The combustion of the small wood removed from the ore a portion of the sulphur, and the reduction was completed by the greater heat arising from the burning of the logs. The lead run down to the bottom and out in front into a basin, whence it was ladled into

the moulds. The loss of metal was of course very large; but a portion was recovered by treating the residue in what was called an ash furnace. The process is still resorted to in places where no furnaces are within reach. But wherever mines are opened that promise sufficient supplies of ore, furnaces are soon constructed in their vicinity. These in use are of two sorts: the Scotch hearth and the reverberatory. Besides these, another small furnace is often built for melting over the slags. This is little else than a crucible built in brick work, and arranged for the blast to enter by an aperture in the back, and for the metal to flow out by another opening in front.

The Scotch hearth is a small blast furnace, but resembles the open forge or blooming fire for iron ores. It has long been in use in Europe, and is the most common furnace at our own mines. In this country it has been greatly improved by the introduction of hot blast; and in its most perfect form is represented in the accompanying figures; figure *a* being a vertical section from front to back, and figure *b* a horizontal section.



SCOTCH HEARTH FURNACE.

A is the reservoir of lead of the furnace, consisting of a box, open at top, about two feet square and one foot deep, formed of cast iron 2 inches thick. From its upper front edge a sloping hearth, H, is fixed so as

to receive the melted lead that overflows, and conduct it by the groove into the basin, B. In this it is kept in a melted state by a little fire beneath, and, as convenient, the lead is ladled out and poured into moulds. D is a hollow shell of cast iron $\frac{3}{4}$ of an inch thick, its inner and outer sides inclosing a space of 4 inches width. Into this space the blast is introduced at E, and becoming heated, passes out at F, and thence through the curved pipe into a tuyere, T, cast in the air-chest 2 inches above the level of the lead reservoir. Before commencing operations this reservoir is to be filled with lead, and is thus kept so long as the furnace is in use; the process being conducted upon the surface of the melted metal. The furnace may be kept in continual operation by adding new charges of galena every ten or fifteen minutes, and working them down after they have become roasted at the surface. The fuel employed is dry pine wood split into small pieces, and billets of these are thrown in against the tuyere just before each new charge of ore, that already in the furnace being raked forward upon the hearth to make room for the fuel, and the blast being temporarily turned off. The old charge is then thrown, together with fresh ore, upon the wood, and the blast is let on, when the heat and flame immediately spread through the materials. The sulphur in the ore serves itself as fuel, accelerating the process by its combustion, and in a few minutes the whole charge is stirred up, spread out on the hearth, and the hard, un-reduced fragments are broken in pieces by blows of the shovel. Slaked lime is sometimes added in small quantity when the partially reduced ore becomes too soft and pasty by excess of heat. Its effect is to lessen this tendency rather by mechanical than chemical action. If any flux is used, it is fluor spar, blacksmith's enders, or bits of iron. The latter hasten the reduction by the affinity of the iron for the sulphur of the ore. The cast iron of the air-chest is protected from the action of the sulphur by the cooling influence of the air blown in; and this is also advantageous by its keeping the furnace from becoming so hot, that the galena would melt before losing its sulphur, and thus form combinations of exceedingly difficult reduction. A fan, run by steam or water power, is commonly employed for raising the blast; but as this gives little pressure, it is replaced to great advantage by blowing cylinders, with an air-

receiver for giving regularly to the current of air. With such an apparatus, the smelter can apply the blast with great advantage at times to keep loosen up the charge, and throw the flame through every part of it. The ores are prepared for smelting by separating from them all the stone and clay particles, and as much as possible of the blende and other impurities that may accompany them. This may require a succession of mechanical processes, in which the ores are crushed to fine fragments and dressed by jugging and screening under water. Not only is the labor and cost of smelting reduced by the purity of the ore, and especially its freedom from blende and pyrites, but the quality also of the metal is thereby improved. Lead that contains less is not adapted for the manufacture of white lead. The American metal being generally free from zinc brings a higher price than Spanish or English lead. With pure ore a cord of wood may be made to produce four tons of lead; and each furnace 7,500 lbs. every 24 hours; a smelter and his assistant managing the operation for 12 hours. At Rome large quantities of lead have thus been smelted at a fully cost for labor of \$5, and for fuel of \$1.50, making \$1.75 per ton. In Wisconsin, before the use of the hot blast, each furnace—half was continued from 8 to 10 hours, until 30 pigs of lead were produced of 2,100 lbs. weight, at an expense of about \$4 for labor, and \$1.50 for fuel.

The other form of furnace—the reverberatory—resembles others of this class employed in smelting copper ores. The sole, or hearth, upon which the ores are spread, is about 2 feet in length by 6 in breadth, and is made to incline rapidly toward an aperture on one side, or at the end under the chimney, and out of which the lead is allowed at the end of each smelting to flow into a receiver outside. The charge is supplied either through a hopper in the arched roof, or through the holes in the sides, which also serve for admitting the pokers used by the workmen to stir up the charge. Unless the galena has been previously oxidized or roasted—a process necessary for poor ores only—this is the first thing to be attended to in all the smelting operations. In the large charge of 50 cwt. of ore this usually takes the first two hours of the process, and is effected in great part by the heat remaining in the furnace from the preceding operation, the doors at the

sides being kept open at the same time to allow free access of air. The oxidation of the sulphur is facilitated by constant stirring of the charge, which brings fresh portions to the surface, causing an oxidation of whole furnaces. As these begin to diminish, the fire is started on the grate, and the heat is raised till the charge softens and the pieces of ore adhere to the sides. The doors are then closed, and the fire is kept for a quarter of an hour, when the smelter opens the door to see if the metal separates and flows down the inclined hearth. If the separation does not go on well it is hastened by opening one of the doors, partially closing the furnace, and stirring the charge. The fire is then again raised. If the charge which has been seen to require it, he treats them with a few shovels of lime and two tons, and when, after having flowed down into the lower portion of the hearth, they are brought into a slaggy consistency, the smelter pushes the slag to the opposite upper edge of the hearth, from which it is moved out through a door on that side by his assistant, while he lets off the lead into the receiver.

The separation by this method is not so perfect as by the Scotch hearth, and the expense of fuel is greater; but the reverberatory is worked without the necessity of steam or water power, which is required to raise the blast for the other process. The slag of the reverberatory contains so much lead that they are always reworked in the slag furnace. Those of the Scotch hearth, when pure ores are employed are sufficiently clear of metal without further reduction. In Europe other sorts of furnaces are in use, which are adapted particularly for ores of poorer quality than are ever smelted in the United States.

In the Hartz mountains, at Clausthal, argentiferous silver ores containing much silica are worked in these cupola furnaces, into which only enough air is admitted to consume the fuel. The object is not to roast out the sulphur, but to cause this to combine with the granulated cast iron, or with the quicklime either of which is mixed with the ores to flux them and form a fusible compound with the sulphur, through which the metallic lead can easily find its way to the bottom. The production of a silicate of lead is thus avoided, which is a difficult compound to reduce, and is always formed when much silica is present. The process

will probably be applied to some of the silicious ores of the United States, and may be particularly suited to the Washoe ores of California.

By all the methods of reducing lead a great loss is incurred by the volatilization of a portion of the lead in white fumes, called lead ashes. These are carried up through the chimney of the furnace and fall upon the ground in the neighborhood, poisoning the vegetation and the water by the carbonate of lead, which results from the fumes. Trees even are killed, and the dogs die off, and also the cattle. In Scotland the lead has been detected in chemical examinations of the bodies of animals thus killed, and it was particularly noticeable in the spleen. For the injury thus occasioned at the furnaces of the United States no remedy has been applied, but at many of the great establishments in Europe, where the loss of lead and the damage to the neighborhood is much more serious, attempts have been made to arrest the fumes, by causing them to pass through long flues in the chimney stacks, in which the particles on cooling would settle down; and their cooling has been hastened by showers of water falling among the vapors. Flues have been extended great distances beyond the works, and have been found much more efficient than any form of condensation by sudden cooling. Some of the works constructed for this purpose are very remarkable for their great extent and the saving they have effected, and similar ones may perhaps be found well worthy of construction at some of the smelting establishments in the United States. At the works of Mr. Beaumont, in Northumberland, England, horizontal or slightly inclined galleries have been completed in stonework, 8 feet high and 6 feet wide, for an extent of 8,789 yards (nearly five miles). This is from one mill alone. The same proprietor has connected with other mills in the same district and in Durham four miles of galleries for the same purpose. The writer who gives the account of these in the recent edition of Ure's Dictionary, by Robert Hunt, remarks: "The value of the lead thus saved from being totally dissipated and dispersed, and obtained from what in common parlance might be called chimney sweepings, considerably exceeds £10,000 sterling annually, and forms a striking illustration of the importance of economizing our waste products." Not only is lead lost

in the fumes, but in the working of argentiferous lead ores, a portion of the silver too is carried off and deposited with them. The fumes collected at the works of the Duke of Buccleuch yield one-third their weight of lead, and five ounces of silver to the ton. The loss of silver is of little importance in this country, where this metal is not obtained at the present time, unless it be at the Washington mine, in North Carolina, and at the Washoe mines, in California; and consequently methods of separating it from the lead possess little more than scientific interest. In the smelting of argentiferous lead ores, the silver goes with the lead, being completely dissolved and diffused throughout its substance. The usual way of separating it is founded on the principle of the lead being a metal easily oxidized and converted into the substance called litharge, in which condition it lets go the silver, which has no affinity either for the new compound of oxygen and lead, or for the oxygen alone. The change is effected by melting the lead in the shallow basins called cupels, formed of a porous earthy material, as the pulverized ashes of burned bones, kneaded with water, and mixed in a framework of iron. When dried, these are set in a reverberatory furnace, and the pigs of lead are melted upon their surface. After being thoroughly heated, a current of air is made to draw through an opening in the side of the furnace directly upon the face of the melted metal. This oxidizes the lead, and the yellow litharge with more or less red oxide, called minium, collects in a thin film upon its surface, and floats off to the edge, sinking into and incrusting the cupel and falling over its side into a receptacle placed to receive it. This process goes on, the lead gradually disappearing as the oxygen combines with it, till with the removal of the last films of oxide the melted silver suddenly presents its brilliant, perfectly unsullied face. The oxide of lead may be collected and sold for the purposes of litharge, as for a pigment, for use in the manufacture of glass, etc.; or it may be mixed with fine coal and converted back into lead, the carbon of the coal effecting this change by the greater affinity it has at a high heat for the oxygen, than the lead has to retain it. By this process, known as cupellation, lead is hardly worth treating for silver, unless it contain about 10 ounces to the ton of the precious metal; and it was therefore an important object to devise a

method of saving with economy the silver lost in the large quantities of the poorer argentiferous leads. Such a method was accidentally discovered in 1829 by Mr. Pattinson, of Newcastle, and is now extensively in use in Europe for the poorer silver-leads, cupellation being preferred for the richer. He observed that when the lead containing silver forms crystals, as it is stirred while in a melted state, the crystals contain little or none of the silver, and may be removed, thus concentrating the silver in the portions left behind. This crystallizing process is applied in the large way as follows: Cast iron pots are set in brick-work side by side, capable of holding each one 4 or 5 tons of lead. The middle one is first charged, and when the lead is melted and stirred, the fire is removed under the next pot to the right; and into this crystals of lead as they form are ladled by means of a sort of cullender, which lets the fluid lead fall back. This instrument is kept hotter than the lead by frequently dipping it in a pot of lead over a separate fire. When four-fifths of the lead have been transferred to the pot to the right, the remainder, which contains all the silver, is removed to the next pot to the left, and the middle pot is then charged with fresh lead, which is treated in the same manner. The process is repeated with each pot, as it becomes full, four-fifths of its contents going to the next pot to the right, and one-fifth to the next to the left, and thus the lead is finally discharged into moulds at one end, and the argentiferous alloy, concentrated to the richness of 300 ounces of silver to the ton, is run into bars about 2 inches square. From these the silver is obtained by cupellation. At one establishment in England, that of Messrs. Walker, Parker & Co., the weekly product of silver is from 8,000 to 10,000 ounces. Whenever the lead mines of the eastern states are made to yield regular returns of lead, the separation of its silver is likely to be carried on in independent establishments, supplied like the copper-smelting works with material from various sources. Works having these objects in view were established in the fall of 1860, at Brooklyn, New York, by Messrs. Bloodgood & Ambler, and will commence operations with the smelting of the Washoe silver-lead ores from California, of which over sixty tons have been delivered at the works for reduction. Their successful treatment will no doubt be followed by

the shipment of other ores of the different metals from various sources; and it is to be hoped that it will hereafter be found more advantageous to send ores to New York to be reduced, than to the smelting establishments on the other side of the Atlantic.

USEFUL APPLICATIONS OF LEAD.—A considerable part of the lead product of the world is converted into the carbonate, known as white lead, and used as a paint. The principal articles of metallic lead are sheet lead, lead pipe, and shot. Sheet lead is manufactured in two ways. The melted lead is upset from a trough suspended over a perfectly level table, covered with fine sand, and furnished with a raised margin; and when the metal has spread over this, a couple of workmen, one on each side, carry along a bar supported upon the margin, pushing forward the excess of lead above that necessary for the required thickness, till it falls over the end of the table. By the other method, called milling, the lead is cast in a plate, 6 or 7 feet square, and 6 inches thick, and this being taken up by a crane, is placed upon a line of wooden rollers, which form a flooring for the length it may be of 70 or 80 feet and a width of 8 feet. Across the middle of this line are set the two heavy iron rolls by which the lead plate is compressed, as it is passed between them. The top of the lower roll is on a level with the top of the wooden rollers, and the upper roll is so arranged that it can be set nearer to or further from the lower one, as the thickness of the plate requires.

Lead pipe was formerly made by turning up sheet lead and soldering the edges; and is still prepared in this way for the large sizes, as those over six inches diameter. After this a method was contrived of casting the lead in a hollow cylindrical plug, its inner diameter of the bore required, and then drawing this down through slightly conical dies of decreasing diameter, a mandril or steel rod being inserted to retain the uniform diameter of the bore. Pipes made in this way were limited to 15 to 18 feet in length, and the metal was full of flaws. Many attempts have been made to cast long lengths of lead pipe, all of which have proved unsuccessful. In 1820 Thomas Burr, of England, first applied the hydraulic press to forcing lead, when beginning to solidify in cooling, through an annular space between a hollow ring and a solid core secured in its centre. He thus produced pipes of considerable

length. The method of forcing the liquid metal through dies to form pipes was, however, first patented in 1797 by Bramah, who used a pump for this purpose. The process was introduced into this country in 1840-41 by Messrs. Tatham & Brothers, now of New York, who invented and patented an important improvement in the method of securing the die and core. In this operation the melted lead is made to flow from the furnace into a cylindrical cavity in a block of cast iron, which may be of 1800 lbs. weight, and from this, when cooled to the proper temperature, it is forced out through the die by a closely-fitting piston. By one process the piston, starting from the bottom of the cylindrical cavity, moves upward, carrying with it the slender core or rod which determines the diameter of the bore of the pipe, and pushes the melted lead before it through the die fixed in the top of the cast iron block. The pipe as it is formed passes out from the top of the machine, and is coiled around a receiving drum. By the machine contrived by Mr. Cornell of New York, the great iron block containing the lead rises by the pressure of the hydraulic machine, and the piston which is fixed above it enters the cavity. The piston in this case is hollow and the die is set in its lower end. The core is secured in the bottom of the block, and is carried upward as this rises. The pressure applied in this operation amounts to 200 to 300 tons. Dies are used of a great variety of sizes, according to the kind of pipe required. Lead wire is made in this way with a die of very small size without a core. It is used for securing vines and attaching tags to fruit trees and shrubs. The principal works in the United States engaged in the manufacture of sheet lead and lead pipe are in New York, Boston, Philadelphia, Chicago, Cincinnati, and Saint Louis.

Lead pipe is in general use as the most convenient conduit for water for domestic purposes. It is readily bent to any angle, and is made to adapt itself to any position. When water freezes within and bursts it, the damage is easily repaired; joints are also made with little trouble. The lead is not liable to become rusty like iron, and is cheaper than tin or copper. These qualities give to it a preference over other kinds of pipe, notwithstanding the very serious objection that the lead is often acted upon by the water, and produces poisonous salts of a very dangerous character. Some waters more than

others have a tendency to promote the oxidation of the lead. This is particularly likely to occur with nearly all waters in pipes which are alternately exposed to the action of air and water, as when the water being drawn out, the air enters and takes its place. The oxide of lead is converted by carbonic acid gas, which is present in almost all water, into a carbonate of lead which is soluble to some extent in an excess of the gas, and is carried along, bearing no indication of its presence, while the lead pipe continues to be corroded until it may be in places eaten nearly through. The water used for drinking and for culinary purposes is thus continually introducing an insidious poison into the system, the effect of which is at last experienced in the disease known as the painters' colic, often followed by paralysis. As this occurs without a suspicion being awakened of the real source of the disease, and is produced by quantities so small as from $\frac{1}{16}$ to $\frac{1}{20}$ of a grain in the gallon, the use of lead pipe is properly regarded by scientific men as always unsafe; and some substitute for this metal in pipes and in sheets used for lining water cisterns, is highly desirable. It has been proposed to coat the pipe with some insoluble lining; but such an application necessarily increases its cost, it may perhaps be removed by hot water flowing through the pipe, and the purchaser may have no confidence in the coating being faithfully applied, or as certain to be efficient during long-continued use. Block tin is perfectly safe, but it is expensive, and is moreover likely to be alloyed with the cheaper metal lead, which in this condition is thought to be equally dangerous as when used alone. As no popular substitute for lead is provided, it is a reasonable precaution for those employing it to be always watchful and on their guard against its evil effects—using as little of it as necessary, causing the water to be occasionally tested, and, whenever opportunity offers, cutting open and examining pieces of the pipe to see whether its internal surface is corroded, and every morning before using the water that has stood in the pipes, to cause this to flow away together with enough more to thoroughly wash out the pipes and remove any salts of lead that may have formed in them during the night.

Large quantities of lead are consumed in the United States in the manufacture of shot and bullets; and one ingenious method of producing shot is an American invention.

The quality of the lead employed for this purpose is of little importance. The harder and inferior sorts, which would not answer for the white lead manufacture, are economically diverted to this object. If too brittle, from the iron and antimony combined with the lead, the metal is made to assume the right quality by mixing with it a small proportion of arsenic, which, for most kinds of lead, may amount to one per cent. To introduce this into the lead a large pot of the metal is melted, and powdered charcoal or ashes is laid around its edge. The arsenical compound, either of white arsenic or of orpiment (the sulphuret of arsenic), is then stirred into the centre of the mass, and a cover is tightly luted over the pot. In the course of a few hours, the mixture being kept hot, the combination of the lead with the arsenic is completed, and a portion of litharge floats upon the surface. This is formed from the oxygen of the white arsenic uniting with some of the lead, and it retains a portion of the arsenic. The alloy is now tried by letting a small quantity of it fall from a moderate height through a strainer into water. From the appearance of the globules the quality of the mixture is judged of. If they are lens-shaped, too much arsenic has been used; but if they are flattened on the side, or hollowed in the middle, or drag with a tail behind them, the proportion of arsenic is too small. When a proper mixture is obtained it is run into bars, and these are taken to the top of a tower, from 100 to 200 feet high, where the lead is melted and poured through cullenders, which are kept hot by being placed in a sort of chafing-dish containing burning charcoal. The lead is thus divided into drops that fall to the bottom, and are received in a vessel of water. Each cullender has holes all of the same size, which is considerably less than that of the shot produced by them. This is owing to the drop of melted lead first assuming an elongated form, which is concentrated into the globular by the air impinging equally upon all sides in the course of its descent. When it reaches the water, it is important that it should have cooled throughout, so that no solid crust be suddenly formed over a fluid interior; and hence, for large shot it is evident the height of the fall must be greater than is required for small shot. The temperature of the lead also, when it is dropped, must vary according to the size of the shot; for the largest size being so low that a straw

is hardly browned when thrust into it. A portion of the lead becomes oxidized and is caught in the cullender, the bottom of which it coats, and serves a useful purpose by checking the too rapid flow of the melted lead through the holes. The holes vary in size, from $\frac{1}{50}$ of an inch for shot larger than No. 1, to $\frac{1}{360}$ of an inch for No. 9. The shot being taken out of the water and dried upon the surface of a long steam chest, are transferred to an iron cask suspended upon an axis passing through its ends, and a little plumbago being introduced with them, the cask is made to revolve until the shot are thoroughly cleaned and polished. The next operation is to separate the imperfect ones from the good. This is done by rolling them all together down a succession of inclined platforms, separated by a narrow space between each. The good shot clear these spaces and are caught below, while the bad ones fall through upon the floor. The good are then introduced into the sifters for assorting them according to their sizes. Several sieves are arranged like drawers in a case; the coarsest above, and finer ones succeeding below. The upper tier of sieves being charged, the case is set rocking, and the shot are soon assorted, and are then ready for packing in bags. Bullets and buck-shot are moulded by hand from a large pot of the metal into moulds with many receptacles.

The American process of shot-making was invented in 1848 by David Smith, of the firm of T. O. Leroy & Co., of New York, by whom it is exclusively used. Its object is to dispense with the use of the costly high towers, by substituting for them a lower fall against an ascending current of air. This current is produced by a fan-blower operating at the base of an upright hollow shaft into which the shot are dropped from a moderate height. The power required to run the fan is not much more than that ordinarily expended in raising the lead to the top of the high towers; and it is found that the lead, in consequence of its being more rapidly and equally cooled in the short descent against the current of air, may be used at a higher temperature than is practicable with that dropped from high towers; and thus it may not only be poured more rapidly, but it has not the tendency to burst in falling and form imperfect shot, as is the case with that dropped from high towers, to guard against which the lead is kept at a low temperature.

There are in New York city, besides this operation, which is carried on by Messrs. Leroy, in Water street, three shot towers, and a fourth is nearly completed on Staten Island. The ordinary capacity of these is from 3000 to 4000 tons of shot per annum. The annual shot production of St. Louis is about the same as that of New York, though there is now only one shot tower in use. There were formerly seven more on the river bluffs below the city, but these have hardly been used since 1847. In Baltimore is a tower the height of which, including ten feet constructed below the surface of the ground, is 256 feet, which exceeds by one foot the height of the famous tower in Vienna, described by Dr. Ure as the highest structure of the kind in the world, being 249 feet above the surface of the ground. Its production is stated to be about 400 tons per annum. In Philadelphia there is one tower which makes about 300 tons annually; in Wythe county, Virginia, is one formed in one of the shafts of the mine, making about 200 tons; and on the Wisconsin river, at Helena, is a small tower probably making about as much more. The actual production of the country in shot and bullets is supposed to be about 7000 tons, and to have made but little advance for many years past.

WHITE LEAD.—Before the introduction of the oxide of zinc as a paint, one of the most important uses of lead was its conversion into the carbonate or white lead. The manufacture was originally carried on almost exclusively in Holland; and it was not until near the close of the last century that it was introduced into England. In the United States it was unknown until after the war of 1812, and being first undertaken in Philadelphia, it was afterward extended to New York and Brooklyn, and in the latter city has prospered more than in any other part of the country. Various attempts have been made to introduce new methods of manufacture, but the old Dutch process has continued in general use; the modifications of it which have raised the manufacture in this country to a higher state of perfection than in any other part of the world being merely improvements in the details, by which ingenious machinery has been made to diminish the labor expended in the process.

White lead is a combination of oxide of lead with carbonic acid, and is obtained in the form of a soft, very white, and heavy

powder. It mixes readily with oil, giving to it a drying property, spreads well under the brush, and perfectly covers the surfaces to which it is applied. It is not only employed alone as the best sort of white paint, but is the general material or body of a great number of paints, the colors of which are produced by mixing suitable coloring matters with the white lead. Besides its use as a paint it is also in demand to a considerable extent as an ingredient in the so-called vulcanized india-rubber. To prepare it, the purest pig lead, such as the refined foreign lead and the metal from the upper mines of the Mississippi, is almost exclusively used. This was by the old methods made in thin sheets, and these into small rolls, to be subjected to the chemical treatment. But according to the American method devised by Mr. Augustus Graham of Brooklyn, and now generally adopted, the lead is cast into circular gratings or "buckles," which closely resemble in form the large old-fashioned shoe-buckles, from which they receive their name. They are six or eight inches in diameter, and the lead hardly exceeds one sixth of an inch in thickness. Ingenious methods of casting them are in use in the American factories, by which the lead is run upon moulds directly from the furnace, and the buckles are separated from each other and delivered without handling into the vessels for receiving them. They are then packed in earthen pots shaped like flower-pots, each of which is provided with a ledge or three projecting points in the inside, intended to keep the pieces above the bottom, in which is placed some strong vinegar or acetic acid. It is recommended that on one side the pot should be partially open above the ledge, and if made full all round, it is well to knock out a piece in order to admit a freer circulation of vapors through the lead. In large establishments an immense supply of these pots is kept on hand, the number at the single manufactory of Messrs. Battelle & Renwick, on the Hudson, being not less than 200,000. They continue constantly in use till accidentally broken below the ledge. Being packed close together in rows upon a bed of spent tan, a foot to two feet thick, and thin sheets of lead are laid among and over the pots in several thicknesses, but always so as to leave open spaces among them. An area is thus covered, it may be twenty feet square or of less dimensions, and is enclosed by board

partitions, which, upon suitable framework, can be carried up twenty-five feet high if required. When the pots and the interstices among them are well packed with lead, a flooring of boards is laid over them, and upon this is spread another layer of tan; and in the same manner eight or ten courses are built up, containing in all, it may be, 12,000 pots and 50 or 60 tons of lead, all of which are buried beneath an upper layer of tan. As the process of conversion requires from eight to twelve weeks, the large factories have a succession of these stacks which are charged one after another, so that when the process is completed in one, and the pots and lead have been removed and the chamber is recharged, another is ready for the same operation.

The conversion of metallic lead into carbonate is induced by the fermenting action, which commences in the tan soon after the pile is completed. The heat thus generated evaporates the vinegar, and the vapors of water and acetic acid rising among the lead oxidize its surface and convert it externally into a subacetate of lead; at the same time carbonic acid evolved from the tan circulates among the lead and transforms the acetate into carbonate of the oxide, setting the acetic acid free to renew its office upon fresh surfaces of lead. When the tan ceases to ferment the process is at an end, and the stack may then be taken to pieces. The lead is found in its original forms, but of increased bulk and weight, and more or less completely converted into the white carbonate. The thoroughness of the operation depends upon a variety of circumstances; even the weather and season of the year having an influence upon it. The pieces not entirely converted have a core of metallic or "blue" lead beneath the white carbonate crust. The separation is made by beating off the white portion, and this being done upon perforated copper shelves set in large wooden tanks and covered with water, the escape of the fine metallic dust is entirely prevented and its noxious effect upon the health of the workmen is avoided. In Europe, rolling machines closely covered are applied to the same purpose, but less effectually. The white lead thus collected is next ground with water between mill-stones to a thin paste, and by repeated grindings and washings this is reduced to an impalpable consistency. The water is next to be removed, and, according to the

European plan, the creamy mixture is next turned into earthen pots, and these are exposed upon shelves to a temperature not exceeding 300° until perfectly dry. Instead of this laborious method, the plan is adopted in the American works of employing shallow pans of sheet copper, provided with a false bottom, beneath which steam from the exhaust-pipe of the engine is admitted to promote evaporation. These pans or "drying kilns" are sometimes 100 feet long and 6 feet broad, and several are set in the building one above another. The liquid lead paste is pumped up into large tanks, and the heavier portion settling down, is drawn off into the pans, while the thinner liquid from the surface is returned to be mixed with fresh portions of white lead. Beside pans, tile tables heated by flues in the masonry of which they are built, are also employed. From four to six days are required for thoroughly drying the white lead. This is the finishing process, after which the lead is ready for packing in small casks for the market.

The manufacture of white lead, which was formerly an unhealthy and even dangerous occupation, has been so much improved by the expedients for keeping the material wet and thus preventing the rising of the fine dust, that the peculiar lead disease now rarely attacks the workmen. The business is conducted altogether upon a large scale, and gives employment to numerous extensive factories in different parts of the country. Some of these have arrangements for converting-stacks that extend under cover 200 feet in length, and their facilities for grinding and drying are proportionally extensive. These, and the time required for fully completing the process and getting the white lead ready for market—which is from three to four months—involve the use of large capital and tend to keep the business in few hands.

There is a vastly increasing demand for pure white lead, and the competition and watchfulness of the trade insure the genuineness of the article thus warranted by the manufacturers. A large class of customers are the grinders, who form a distinct trade, and use and mix the pure article with other substances and with coloring matters to suit their purposes. The mineral, sulphate of barytes or heavy spar, is the chief article used to adulterate white lead, and for this purpose it is obtained from mines in

Connecticut and other places, and is extensively ground in mills for this use alone. When perfectly pure, the powder is absolutely white; it has about the same weight as white lead, and is quite as indestructible; it is, indeed, less acted upon or discolored by noxious vapors. It lacks, however, the body of white lead, and is not so brilliant; and whenever used in any proportion materially injures the paint in those good qualities. Oxide of zinc is also largely mixed with white lead, as will be noticed more particularly in the succeeding chapter.

The principal white lead works, together with the probable amount of their annual production, in the United States are as follows:—

	No. of Works.	Tons.
Brooklyn, N. Y.....	4	8000
Staten Island, N. Y.....	1	1500
Hudson River (Saugerties), N. Y..	1	1500
Buffalo, N. Y.....	1	600
Philadelphia, Pa.....	3	3500
Pittsburg, Pa.....	5	4000
Baltimore, Md.....	1	600
Boston, Mass.....	1	1000
Salem, Mass.....	1	1500
Cincinnati, O.....	2	1500
Louisville, Ky.....	1	700
Chicago, Ill.....	2	1200
St. Louis, Mo.....	3	4000

CHAPTER V.

ZINC.

WHILE the production of the lead mines has been falling off in the United States, that of the zinc mines has been steadily increasing since they were first worked about twenty years since; and the metal is applied to some purposes for which lead has heretofore been almost exclusively used. The growing importance of this product in the United States will justify a reference to the zinc manufacture of Europe.

The metal, as mentioned in the chapter on COPPER, very curiously escaped the notice of the ancients, though they obtained it from its ores in preparing brass, an alloy of copper and zinc. In the metallurgical processes it is readily sublimed by heat, and when its fumes come in contact with the air they are immediately oxidized, burning with a greenish white flame, and are then converted into the white oxide of zinc—a compound of one equivalent of the metal = 34, and one of oxygen = 8; which correspond

respectively to 81 and 9 per cent. These fumes when collected are found to be a white flocculent powder, now known as the white oxide of zinc, or zinc paint. If the vapor of zinc be protected from contact of air and passed through pipes into water, it is condensed into metallic drops, and these may be melted in close vessels and poured into moulds. Cast zinc is a brittle metal of bluish white color and greater lustre than that of lead. By heating it to the temperature of 212° to 300° F. it entirely loses its brittleness, and is made malleable and ductile, so that it can be rolled out into sheets. Its melting point is 680°, while that of lead is 608°.

A variety of ores are worked for this metal; as the sulphuret, called blende; the carbonate, called smithsonite; and the silicate of zinc, or calamine. The last two usually occur associated together. The red oxide is an important ore, but found only in New Jersey. Blende almost universally accompanies galena, and in some lead mines is the prevailing ore. The miners call it black jack. When pure, it consists of zinc 67, sulphur 33. Being more difficult to reduce than the other ores, it has been comparatively little used, though the Chinese are known to have been successful in their management of it. In the United States it lies valueless in immense quantities about many of the lead mines; but it is not improbable the old refuse heaps will yet be turned to profit. At the zinc works near Swansea, in Wales, it has been worked for many years; and in England it has for a few years past come into use. In 1855, it is reported that 9620 tons of this ore from various mines were sold; while of the calamine ores, the produce of the Alston Moor mines, sales of only 182 tons were reported. More ores of each sort were no doubt smelted, but the proportion of each was probably not very different from that stated. Dr. Ure, in his Dictionary, speaks of this ore selling at Holywell for £3 per ton. In France there are now five establishments working blende; while in 1840 all the zinc consumed in the country was imported. Smithsonite resembles some yellowish or whitish limestones, and usually accompanies these rocks, being irregularly bedded among their strata. In its best condition it is obtained in large blocks of botryoidal and reniform shapes, sometimes crystallized. But usually it is in porous crumbly masses, much mixed and

stained with reddish oxide of iron. The pure ore contains 65 per cent. of oxide of zinc (which is equivalent to 52 of the metal) and 35 of carbonic acid. The silicate of zinc is found intermixed with the carbonate, which it resembles in appearance. It contains, when pure, silica 25.1, water 7.5, and oxide of zinc 67.4, corresponding to 54 per cent. of the metal. The red oxide is found only at Mine Hill and Stirling Hill, near Franklin, in the extreme northern county of New Jersey. The pure oxide, of which it is almost exclusively composed, contains 80.26 per cent. of zinc and 19.74 of oxygen. The bright red color is probably derived from the small quantity of oxide of manganese present. The ore is mixed with franklinite iron ore, each being in distinct grains, one red and the other black; and with these is associated a white crystalline limestone, either in disseminated grains with the ores, or forming the ground through which they are dispersed. Two beds, consisting of the zinc and iron ores, lie in contact with each other along the south-eastern slope of the Stirling Hill, between the limestone of the valley and the gneiss of the ridge, dipping with the slope of these rocks about 40° toward the valley, and ranging north-east and south-west. The upper bed, varying from 3 to 8 feet in thickness, consists of more than 50 per cent. red oxide of zinc; and the lower bed, which is 12 feet thick and in some places more than this, is chiefly franklinite, changing to limestone below, interspersed with imperfect crystals of franklinite. At Mine Hill, $1\frac{1}{2}$ miles north-east from Stirling Hill, two distinct beds are again found together, that containing the most zinc in this case being the under one of the two, lying next the gneiss. These localities have been well explored; the beds have been traced considerable distances along their line of outcrop; and at Stirling Hill the red oxide of zinc has been mined for more than ten years by the New Jersey Zinc Company. Their workings have reached to a depth of about 250 feet, and have afforded the finest specimens of zinc ore ever seen. A single mass of the red oxide was sent in 1851 to the Great Exhibition in London, which weighed 16,400 lbs., and attracted no little attention, from the purity, rarity, and extraordinary size of the specimen. The Passaic Mining and Manufacturing Company also have opened two beds of the same ore on their property at Stirling

Hill, adjoining that of the New Jersey Zinc Company, and between 1854 and 1860 took out about 30,000 tons of rich and lean ores. At the depth of 178 feet, the principal bed is 21 feet wide, of which about $2\frac{1}{2}$ feet is rich ore, and the rest limestone sufficiently interspersed with oxide of zinc to render it worth dressing. This company completed, in the year 1859, at the mines, very extensive works for dressing the lean ores before they are shipped to their furnaces at Jersey City. The principal supplies of their ores hitherto have been of the smithsonite and calamine from the mines in the Saucon valley, Lehigh county, Pennsylvania, of which they mined about 5,000 tons in the first year. These ores are extensively worked to the north of Friedensville, both by this company and the Pennsylvania and Lehigh Zinc Company, whose furnaces are at Bethlehem, in Lehigh county. The mines of the two companies, which are near together, are known as the Saucon mine and the Lehigh Zinc Company's mine. They were first opened in 1853. The two kinds of ore are found together, as is common in the European mines, and more or less blende is interspersed among them. They form very large irregular beds in limestone of the lower Silurian period, and are penetrated by veins of quartz, which traverse both the ore and limestone. Huge masses of limestone lie interspersed among the ores. The deepest workings at the Saucon mine are about 100 feet below the surface; and from this depth galleries have been run in every direction, exposing to view more than 50,000 tons of ore. The ores of best quality are found in the lower workings.

About the same time that these mines were opened in Lehigh county, another, producing similar kinds of zinc ore, was discovered near Lancaster, in Pennsylvania; but after being explored it was found to contain so much blende and galena, that it was abandoned as worthless. Large deposits of the same varieties of zinc ore are known to exist in Tennessee; one locality at Mossy Creek, a few miles north-east of Knoxville, and another at Powell's river, a branch of the Clinch river, in Campbell county, about 40 miles north of Knoxville. These beds, examined by the writer in 1858, unquestionably contain very large quantities of excellent ore. The former, being close to the East Tennessee and Virginia railroad, is very conveniently situated; and the other

is within half a mile of a river navigable at certain seasons by flat-boats. Below its junction with the Clinch river are beds of bituminous coal, and the river is thence navigable by steamboats. At Kingston it is crossed by a railroad.

Very pure ores of similar character have been found in Arkansas. The localities are in a lead mining region in Lawrence, Marion, and Independence counties; but chiefly in the first named. The ores occur in a formation of magnesian limestone, imbedded in red ferruginous clay. They are almost exclusively smithsonite, containing very small proportions of silicate of zinc. Crystals of smithsonite and of blende are found upon the lumps of pure, flesh-colored ore. The district promises to become an important one for the supply of zinc to the western states.

The following are analyses of ores from the Saucon valley mines; the first three by Prof. John Torrey, of the New York Assay Office, being of specimens, and the last two of samples of large shipments. No. 4 was made at the Assay Office, Hatton Gardens, London; and No. 5 in Paris.

No. 1.	
Oxide of zinc.....	48.90
Carbonic acid.....	26.40
Peroxide of iron.....	3.15
Carbonate of magnesia.....	.62
Silica.....	18.50
Water.....	.30
Loss.....	2.13
	100.00
Metallic zinc.....	39.30
No. 2.—Granular Sulphuret of Zinc.	
Sulphuret of zinc.....	73.27
Sulphuret of iron.....	1.49
Silica.....	25.50
	100.26
Metallic zinc.....	49.09
No. 3.—Wazy Sulphuret of Zinc.	
Sulphuret of zinc.....	97.63
Sulphuret of iron.....	1.54
Silica.....	1.40
	100.57
Metallic zinc.....	65.41
No. 4.—Mixture of Blende and Carbonate of Zinc.	
Zinc.....	61.70
Sulphur.....	19.82
Iron.....	4.76
Silica.....	1.00
Carbonic acid.....	9.90
Phosphate of lime.....	.88
Oxygen, water, and loss.....	1.94
	100.00
Contains of silver 4.15 ozs. to the ton of 20 cwt.	

No. 5.		
Zinc.....	Carbonate of zinc, 75.1	42.0
Oxygen.....		10.5
Carbonic acid.....		22.6
Protoxide of iron.....	Carb. of iron, 10.2	7.3
Carbonic acid.....		2.9
Silica.....		11.8
Moisture.....		2.9
		100.0

METALLURGIC TREATMENT AND USES.

Zinc ores are applied to practical purposes, not only to produce the metal, but also the white oxide of zinc, which is considerably used as a paint. The ancients used an ore they called *lapis calaminaris*, to make brass, by melting it with copper in crucibles, not knowing that another metal was thus formed which produced an alloy with the copper. Although the metal was discovered in the 16th century, the nature of its ores was little known before the middle of the last century. It is now prepared upon a large scale in Belgium and Silesia, and small quantities are produced in England, France, and different parts of Germany. The simple method of obtaining zinc from its ores, called distillation *per descensum*, was introduced into England about the year 1740, and was derived from the Chinese, who appear to have been acquainted with the metal long before it was known to the Europeans. As now practised in Great Britain, the ores are first calcined, the effect of which is to expel a portion of the water, carbonic acid, and sulphur they contain. They are then ground to powder, and mixed with fine charcoal, or mineral coal, and introduced into stationary earthen pots, or crucibles. When set in the furnace, an iron pipe, passing up through the bottom of the hearth, enters the crucible, and connects with an open vessel directly beneath. About six pots are set together under a low dome of brick-work, through which apertures are left for filling them. Each one has a cover, which is luted down with fire clay; and the iron tube in each is stopped with a wooden plug, which, as the operation goes on, becomes charred and porous, so as to admit through it the passage of the zinc vapors. The tubes are prevented from being clogged with depositions of the condensed zinc, by occasionally running a rod through them from the lower end. The zinc collects in the dishes under the tubes, in the form of drops and powder, a portion of which is oxidized. The whole is transferred to melting-pots,

and the oxide which swims upon the surface of the melted metal is skimmed off and returned to the reducing crucibles, while the metal is run into moulds. The ingots are known in commerce as spelter.

In the United States zinc was first made by Mr. John Hitz, under the direction of Mr. Hassler, who, by order of Congress, was engaged about the year 1838 to manufacture standard weights and measures for the custom-houses. The work was done at the U. S. arsenal at Washington, the ores used being the red oxide of New Jersey. The expense exceeded the value of the metal obtained, and it has generally been supposed that we could not produce spelter so cheaply as it can be imported from Europe. The next experiments were made at the works of the New Jersey Zinc Company, 1850, on the Belgian plan. In these great difficulties were experienced for want of retorts of sufficiently refractory character to withstand the high temperature and the chemical action of the constituents of the ore. The franklinite, which always accompanies the red oxide ores, was particularly injurious by reason of the oxide of iron forming a fusible silicate with the substance of the retorts. These trials consequently failed after the expenditure of large sums of money. The next important trial was made in 1856, by a Mr. Hoofstetter, who built a Silesian furnace of 20 muffles for the Pennsylvania and Lehigh Zinc Company at their mine near Friedensville. This proved a total failure, and seemed almost to establish the impracticability of producing spelter with the American ores, clays, and anthracite. About this time Mr. Joseph Wharton, the general manager of the Pennsylvania and Lehigh Zinc Company, and Mr. Samuel Wetherill, of Bethlehem, both hit upon the same plan of treating zinc ores in an open furnace, and leading the volatile products through incandescent coal, in order to reduce the zinc oxide so formed, and draw only metallic and carbonaceous vapors into the condensing apparatus. Mr. Wharton constructed his furnace in Philadelphia, and Mr. Wetherill his in Bethlehem. The former having completed his trials, filed a caveat for the process, but soon after abandoned it as economically impracticable. The latter continued his operations, patented the method, and produced some zinc, eight or ten tons of which were sold to the U. S. Assay Office in New York. The manufacture was not,

however, long continued. In 1858, Mr. Wetherill recommenced the production of zinc, adopting a plan of upright retorts, somewhat like that in use in Carinthia, in Austria, and that of the English patent of James Graham. Mr. Wetherill had succeeded in procuring good mixtures of fire clays, and his retorts made of these and holding each a charge of 400 lbs. of ore, proved sufficiently refractory for the operation. The works now under his charge at Bethlehem, erected in 1858-9, and belonging to the owners of the Saucon mine, have a capacity of about two tons of metal daily.

Mr. Wharton, after abandoning the method of reduction by incandescent coals, continued his experiments on different plans, and finally decided on the Belgian furnace as the best, after having actually made spelter from silicate of zinc, with anthracite, in muffles of American clays, at a cost below its market value. These trials were made in the zinc oxide works of the Pennsylvania and Lehigh Zinc Company. Their success encouraged the company to construct a factory at Bethlehem for reducing zinc ores, and this was done under the direction of Mr. Wharton in 1860. The capacity of the works is about 2000 tons per annum, and their actual daily product in the winter of 1860-1, is over three tons. Four stacks or blocks are constructed, each containing four furnaces. To each furnace there are 56 retorts, making in all 896, working two charges in twenty-four hours. Their total capacity is about five tons of metal. Besides the ordinary spelter of this manufacture, which, as will be seen by the remarks that follow, is remarkable for its freedom from injurious mixtures, and is the best commercial zinc in the world, Mr. Wharton also prepares from selected ores a pure zinc for the use of chemists, and for purposes in which a high degree of purity is essential. This is cast in ingots of about nine pounds each, and is sold at the price of ten cents per pound. For the supply of chemists, and for the batteries employed by the telegraph companies, the American zinc of this manufacture is preferred to all others. The total annual consumption of crude spelter in the United States amounts to the value of about \$600,000; and the value of sheet zinc, nails, etc., is about as much more.

The commercial zines, it has long been known, are contaminated by various foreign substances, the existence of some of which

is indicated in the finely divided black substance which remains floating or sinking in the liquid, when the metal is dissolved in dilute acids. The impurities have been stated by different chemists to consist of a great variety of substances, such as lead, cadmium, arsenic, tin, iron, manganese, carbon, etc. They injuriously affect the quality of the metal for many of its uses; and the presence of one of them, arsenic, is fatal to the highly important use of zinc by chemists, as a reagent in the detection of arsenic in other substances. Arsenic in the form of a sulphuret often accompanies the native sulphurets of zinc, and its oxide, being volatile, is readily carried over with the zinc fumes in the metallurgic treatment of blende, and may thus be introduced into the spelter. It is evidently, therefore, a matter of consequence to know the qualities of the different zincs of commerce, and the exact nature of the impurities they contain. Very thorough investigations having these objects in view have recently been made in Cambridge, Massachusetts, by Messrs. Charles W. Eliot and Frank H. Storer of Boston, and the results of these, with a full description of their methods of examination, were communicated, May 29, 1860, to the American Academy of Arts and Sciences, and published in the eighth volume of the new series of their Memoirs. Eleven varieties of zinc from different parts of Europe, and made from the ores of New Jersey, and of the Saucon valley, Pennsylvania, were experimented upon, of all of which large samples were at hand. These varieties were the following: 1, Silesian zinc; 2, Vieille Montagne zinc; 3, New Jersey zinc; 4, Pennsylvanian zinc, Bethlehem, Pennsylvania; 5, Vieille Montagne zinc, employed at the United States mint, Philadelphia; 6, zinc of MM. Rousseau, Frères, Paris, labelled and sold as *zinc pur*; 7, sheet zinc obtained in Berlin, Prussia; 8, zinc made near Wrexham, North Wales; 9, zinc from the Mines Royal, Neath, South Wales; 10, zinc from the works of Dillwyn & Co., Swansea, South Wales; 11, zinc from the works of Messrs. Vivian, Swansea. All of these, except the Pennsylvania zinc, furnished an insoluble residue, which was found to consist chiefly of metallic lead, and this proved to be the principal impurity of all the samples examined; "the carbon, tin, copper, iron, arsenic, and other impurities found in the metal by previous observers, occur either in very minute quantities, or

rarely, and doubtless accidentally." The proportions of lead present in 100 parts of each of the varieties examined were respectively as follows: in No. 1, 1.46; 2, 0.292; 3, 0.079; 4, 0.000; 5, 0.494; 6, 0.106; 7, 1.297; 8, 1.192; 9, 0.823; 10, 1.661; 11, 1.516. The New Jersey zinc was found to contain a sensible quantity of tin, copper amounting to 0.1298 per cent., iron 0.2088 per cent., and an unusually large amount of arsenic. Traces of this were also detected in the white oxide prepared from the ores of the New Jersey mines, and in the red oxide ore itself; but the same ore afforded no clue as to the source whence the copper was derived, a metal of which not the slightest traces were discoverable in the other zincs. None of the samples contained sufficient arsenic to admit of its proportion being determined, and some were entirely free from it, as some of the Belgian and Pennsylvania spelter, but traces of it were met with in other samples from the same regions, indicating that the occasional use of inferior ores, such as blende, intermixed with the carbonates and silicates, might introduce this substance, or possibly it might come over only in the first part of the distillation, and the zinc collected in the latter part might be quite free from it. The Silesian zinc contained minute quantities of sulphur and arsenic; and the English zinc more arsenic than any other, except perhaps the New Jersey. The purest of all the samples was that from Bethlehem, Pennsylvania, some of it yielding no impurity, except a trace of cadmium. The source of a trace of arsenic in another sample is supposed to be in the use of the crust of oxide of zinc from the operations connected with the manufacture of white oxide of zinc, no particular care being taken in that process to reject inferior ores, and this crust being taken to the other works where the metal is prepared and mixed with the selected ores employed for this use, it has thus introduced the arsenic. As the authors of the paper remark, there seems to be no reason why zinc of uniform purity should not be obtained from the excellent ores of the Saucon valley mines.

EUROPEAN MANUFACTURE.

A large portion of the zinc of commerce is furnished by the works of the Vieille Montagne Company, established near the frontier of Belgium and Prussia, chiefly in

the province of Liege of the former country. A large number of mines are worked in this region, the most important of which is that of the Vieille Montagne or Altenberg, situated in the village of Moresnet, between Aix-la-Chapelle and the town of Liege. It is said that the great body of carbonate of zinc found here was worked as long ago as the year 1435, and that for four centuries it was not known that the ore was of metallic character, but it was used as a peculiar earth adapted for converting copper into brass. The ore lies in a basin-like depression in strata of magnesian limestone, and is much mixed with beds of clay intercalated among its layers. The ore is chiefly carbonate mixed with the silicate and oxide of zinc. Some of it is red, from the oxide of iron intermixed, and this produces only about 33 per cent. of metal. The purer white ore yields about 46 per cent., and is moreover much preferred on account of its working better in the retorts. The furnaces employed in the distillation of these ores are constructed upon a very large scale, and on a different plan from those in use in Great Britain. The general character of the operations, however, is the same. The ores are first calcined, losing about one fifth of their weight. They are then ground in mills, and charges are made up of 1100 lbs. of the powdered ore mixed with 550 lbs. of fine coal. The mixture being well moistened with water, is introduced into cylindrical retorts, which are three feet 8 inches long and 6 inches diameter inside, set inclining outward, to the number of 42 in a single furnace, and 4 such furnaces are constructed in one stack. The open end of each retort connects, by means of an iron adapter 16 inches long, with a wrought-iron cone, the little end of which, projecting out from the furnace, is only an inch in diameter. After the charges have been sufficiently heated, the sublimed zinc condenses in the neck of the retort and in the adapter and cone. The last two are then removed, and the zinc and oxide are collected from them, and the liquid metal in the neck of the retorts is drawn out and caught in a large ladle, from which it is poured into moulds. The zinc thus obtained is remelted before it is rolled. Two charges are run through in twenty-four hours, each furnace producing from 2200 lbs. of ore about 620 lbs. of metal, which is about 30 per cent. From a late report of these operations it appears that there are

seven large smelting establishments belonging to the Vieille Montagne Zinc Mining Company, on the borders of Belgium and Prussia, comprising 230 furnaces. The annual product of these is 29,000 tons of spelter, of which 23,000 tons are converted into sheet zinc, and about 7000 tons are rolled at mills not the property of the company. They also manufacture oxide of zinc in three establishments devoted to this operation, to the amount of about 6000 tons annually. The company also purchases spelter very largely.

The metallurgy of zinc has, within a few years past, become an important branch of industry in Upper Silesia on the borders of Poland, and not far from Cracow. In 1857 there were no less than 47 zinc works in this part of Prussia, one of which, named Lydog-niahütte, at Königshütte, belonged to the government, and the remainder were owned by private companies and individuals. In that year their total production was 31,480 tons of spelter, valued at about 17,660,000 francs. Many of the establishments belong to the Silesian Company, which also owns several coal mines near their works, and a number of zinc mines. The government works are supplied with ores from their own mines, and also from all the others, being entitled to one twentieth of their product. From a description of the operations published in the sixteenth volume of the *Annales des Mines*, fifth series, 1859, it appears that the processes are the same which had been employed for full twenty years previously, and each establishment presents little else than a repetition of the works of the others. The furnace in use is a double stack, furnished along each side with horizontal ovens, into each of which three muffles or retorts are introduced. These are constructed of refractory fire clays, and are charged, like the retorts of gas furnaces, by conveying the material upon a long charger or spoon into the interior. Their dimensions are about 4 feet long, 22 inches high, and 8½ inches wide, and the weight of the charge introduced is only about 55 pounds. The ovens on each side of the stacks contain as many as 20 and sometimes 30 retorts. The same stack contains besides, 1st, an oven in which the ores belonging to it are roasted for expelling the water and a portion of the carbonic acid they contain (a process in which they lose about $\frac{1}{3}$ their weight); 2d, an oven for baking the retorts, each establishment making its own; and 3d, a furnace for remelting and purifying

the zinc obtained from, the retorts. Several stacks are arranged in a large building with close walls and open along the top of the roof to allow the smoke to escape. On one side, connected with it, are the workshops in which the muffles are made and various other operations are carried on.

The principal zinc mines are in the vicinity of Beuthen, and are found in the magnesian limestones of the new red sandstone formation. They are connected with the zinc works, which are principally near Königshütte, by branch railroads connecting with the principal line of road between Tarnowitz and Kattowitz. The ores are chiefly carbonates, always mixed with much oxide of iron, which is sometimes present to the extent of 20 per cent., and with them is also associated more or less silicate of zinc, blende, galena, and cadmium. Their percentage of zinc is very variable, rarely reaching 35, and probably averaging 21 or 22 per cent. Much that is worked does not exceed 12 per cent. They lie in irregular deposits, and it is found that their yield of zinc has been gradually falling off, so that it is now only about two fifths of what it was formerly. This low yield involves a large consumption of fuel, which is 20 tons for one of zinc obtained; and if this deterioration continues, the mines must some time hence be abandoned. The coal employed in working the ores is of poor quality, burning without flame; but it leaves no cinder, and is procured from mines very near the works, and at the extraordinary low price of 6 to 7 francs the 1000 kilogrammes (about one ton). The retorts are charged every 24 hours with roasted ore reduced to the size of nuts, and

mixed with oxide of zinc from previous operations, with the dross from the crucible employed in remelting, with the incrustations from the muffles and their connections outside the furnaces, and in fine with cinders that have fallen through the grates, these last making about $\frac{1}{4}$ the bulk of the charge. The workmen having discharged a muffle of the liquid zinc and oxide remaining from the previous operation by drawing them forward, so that they fall upon an iron shelf placed below to catch them, and having repaired any cracks and holes in the muffle, they introduce the new charge in small portions at a time, and immediately adjust the outer connection, which is also of earthenware bent down at a right angle, and close up the openings in front. The zinc soon begins to distil over, and drops down upon the iron shelf, forming pieces of all shapes; and it is more or less mixed with oxide colored yellow by the oxide of cadmium. When remelted and run into moulds, the spelter is stated to have about the following composition: zinc, 97.50, cadmium, 1.00, lead, 0.20, arsenic, 0.84, sulphur, 0.05, together with traces of tin, iron, and carbon; but the character and proportion of the impurities are probably very variable. The expenses of the manufacture at the royal works amounted for the year 1856 to 48.60 francs the metrical quintal (220.47 lbs.), and in 1858 to 54.84 francs; consisting in the latter year of the following items: ore, 26.84; fuel, 14.30; labor, 7.00; materials employed, 3.70; general expenses, 3.00. The operations of the Silesian Company at their several works for the first half of the year 1858 are thus presented:—

COST OF THE SEVERAL ITEMS PER METRICAL QUINTAL OF PRODUCT.

Name of Works.	Ores treated. Met. quint.	Zinc	Cost of	Fuel. Francs.	Ores. Francs.	Sundry	Total cost.
		obtained. Met. quint.	labor. Francs.			expenses. Francs.	
Gabor Silesia.	112,399	19,703	4.98	10.35	11.40	4.27	31.00
Paulshutte.	40,784	4,928	7.10	14.69	14.24	4.77	40.80
Thurzshutte.	37,458	4,495	7.57	12.08	12.92	4.90	37.47
Friedenshütte.	15,345	2,346	5.96	10.66	13.98	4.62	35.22
Stanislawshütte.	40,534	3,978	8.83	16.18	15.66	6.23	46.90
Carlschutte.	45,918	5,723	6.06	14.80	13.23	6.91	41.00
	292,438	41,173					

The general consumption of spelter throughout the world is estimated in the report to which we have already referred, relating to the Vieille Montagne Company, to be about 67,000 tons, of which about 44,000 tons are sheet zinc applied as follows:—

	Tons.
For roofing and architectural purposes.	23,000
“ sheathing of ships.	3,500
“ lining packing cases.	2,500
“ domestic utensils.	12,000
“ stamped ornaments.	1,500
“ miscellaneous uses.	1,500
	44,000

The estimate of 67,000 tons as the total annual production of zinc is probably too small for Europe alone. Taking the product above given of the works of the Vieille Montagne Company, viz., 29,000 tons, and that of the Silesian furnaces, 31,480 tons, there remain only 6,520 tons to be divided among the other zinc-producing countries. These are Poland, on the borders of Silesia, the annual production of which is usually given as 4000 tons; England, which has rapidly advanced from 1000 tons of spelter per annum to 6900 tons in 1858; Austria, which produces 1500 tons; Sweden, 40 tons; and the Hartz 10 tons. Zinc, it is believed, is also manufactured to some extent in Spain. The European production would, therefore, seem to exceed 73,000 tons, and for the total production of the world, that of the United States and of China should be added. Of the extent of the manufacture of the latter country we know nothing. The United States produces of oxide of zinc and spelter over 7,000 tons, and imports 12,000, annually.

The value of the ores at different costs of the metal is given in the following recently prepared table from one of the European houses:—

SCHEDULE OF THE COST OF ZINC ORE ON SHIPBOARD AT

ANTWERP.			
CARBONATE OF ZINC.			
Metal worth 50 francs the 100 kilogrammes.	Metal worth 55 fr. the 100 kilogrammes.	Metal worth 60 fr. the 100 kilogrammes.	
Percentage of zinc by analysis.	Value of 100 kilogrammes.	Value of 100 kilogrammes.	Value of 100 kilogrammes.
Francs.	Francs.	Francs.	Francs.
40	80.00	91.50	109.00
45	102.50	119.50	136.50
50	125.00	144.50	164.00
55	147.50	169.50	191.50
60	170.00	194.50	219.00
65	192.50	219.50	246.50
70	215.00	244.50	274.00
SILICATE OF ZINC.			
40	45.00	57.00	69.00
45	67.50	82.00	96.50
50	90.00	107.00	124.00
55	112.50	132.00	151.50
60	135.00	157.00	179.00
65	157.50	182.00	206.50
70	180.00	207.00	234.00

A kilogramme is equivalent to 2205 lbs. avoirdupois.

Twenty-five years ago the quantity of zinc used for roofing did not exceed 5,000 tons per annum, and no zinc was employed for sheathing ships, or lining packing cases. The stamped ornaments in this metal only came into use in 1852. In Germany zinc is now very generally used for roofing; and in Paris it has been employed for nearly every

roof constructed during the last twenty-five years. In laying the sheets great care is taken that the metal has sufficient room to expand and contract by change of temperature; and especially that it is fastened with zinc nails, and is allowed to come nowhere in contact with iron—even with nail heads. The purer the metal the longer it lasts.

Besides the uses named for this metal, it is employed for coating sheet iron, making what is called galvanized iron; for pipes for conveying liquids; for baths, water-tanks, milk-pans and pails, plates for engraving; for galvanic batteries; for nails, spikes, and wire; for signs; music printing; and for the cornices of buildings. It has also been cast into statues, in imitation of bronze. The Vieille Montagne Company sent to the Great Exhibition in London a statue of Queen Victoria, which with its pedestal of zinc was twenty-one feet high. By a process somewhat like lithography, called Zincography, drawings, old engravings, and autograph letters are transferred to it, and after treatment with acids, printed from a raised surface. A modification of this process called Photozincography, accomplishes the difficult task of printing from a photograph. Zinc is also an important reagent in chemical operations, and is employed with sulphuric acid to decompose water for obtaining hydrogen gas.

ZINC PAINT.

White oxide of zinc was first recommended as a substitute for white lead by the celebrated Guyton de Morveau about the close of the last century, during his investigations on the subject of lead poisoning; and to him it was suggested by Courtois, a manufacturer at Dijon. The high price of zinc at that time, and ignorance respecting the proper manner of using the oxide of zinc, prevented its introduction. It was many years after this that methods of producing it as cheaply as white lead were devised by M. Leclaire, a house-painter of Paris; and he also first prepared to use with it a series of yellow and green unchangeable colors, to replace those before in use having noxious bases of lead, copper, or arsenic; and also a drying oil, prepared by boiling linseed oil with about five per cent. of oxide of manganese. His process, which is still the one in general use in Europe, is based on the treatment of the metal instead of the ore, as practised in this country, and scarcely any white oxide of zinc is there made by

any other method. The furnaces employed are similar to those for producing the metal, or like those of the gas works. When the retorts set in these furnaces have become very hot, they are charged with the ingots of zinc. The metal soon melts, and its vapor passes off through the outlets of the retorts, where it meets a current of air, and both together are drawn on through the condensing apparatus either by the draught of a chimney, or by an exhausting fan at the further extremity of the apparatus. The metallic vapors become oxidized by mixing with the air, and are converted into a light, flaky, white powder, which is the oxide of zinc. The arrangements for condensing and collecting this are similar in principle to those employed for the same purposes in the American process. By making use of the metal in retorts, instead of subliming it from ores contaminated with their own impurities, and mixed with the coal required for conducting the process, a much purer oxide of zinc is obtained; and by selecting the purest sorts of spelter, the beautiful article, called by the French *blanc de neige*, or "snow-white," is produced, which is employed by painters in the place of the "silver-white." With the use of other zinc, the product is fit to be substituted for the best white lead. But if the metal has been made from ores containing cadmium or iron, or if old zinc has been introduced to which any solder adheres, according to the French chemists oxides of other metals are produced, and are taken up in small quantities with the zinc vapors, imparting to the oxide a slightly yellow or greenish tint, which if not very decided may however disappear when the paint is mixed; but the experience of American manufacturers does not accord with this explanation.

The manufacture of white oxide of zinc direct from the ore is a purely American process, established by the experiments of Mr. Richard Jones of Philadelphia in the year 1850. The great bodies of the rich ores of northern New Jersey had at various times, for the past two centuries, attracted the attention of many persons interested in metallurgical operations; and of late years numerous attempts had been made to devise some method of converting them to useful purposes. Zinc, however, was a metal not much in demand, and nothing was known of the useful qualities of the white oxide. When the value of this had been demon-

strated in Europe, and the practicability of producing it economically from the red oxide was shown, a company was organized in New York under the name of the New Jersey Zinc Company, for the purpose of carrying on this manufacture upon a large scale. This association was incorporated by the Legislature of New Jersey, February 15, 1849, and the report of their operations, made December 31, 1853, by their president, C. E. Detmold, Esq., showed a production, for 1852, of 2,425,506 lbs. of oxide; and for 1853, of 4,043,415 lbs.; and the total production for 10 years, ending with 1860, has amounted to above 19,500 tons. Their works were established at Newark, N. J., to which place the ores are brought by the Morris and Essex canal; and the anthracite consumed in the manufacture is also delivered by water transportation. The company has forty furnaces, that may be kept in constant operation. The character of the process is like that which will be given below, as conducted by the Passaic Mining and Manufacturing Company.

The success of the enterprise of the New Jersey Zinc Company, and the discovery in 1853 of the great beds of silicate and carbonate of zinc in the Saucon valley, Pennsylvania, led to the organization in that year of the Pennsylvania and Lehigh Zinc Company, and the erection of furnaces for making the oxide at Bethlehem, on the Lehigh river. The operations were conducted by Samuel Wetherill, Esq., by a patented process of his own invention, and at a contract price of \$50 per ton; the ore being delivered by the company at the works for \$1.50 per ton. About four tons were consumed to the ton of oxide. The company mined up to January, 1860, about 60,000 tons of ore, and at that time were manufacturing about 320,000 lbs. of oxide of zinc per month.

A third company was established in 1855, called the Passaic Mining and Manufacturing Company, and their works, constructed at Communipaw, on the Morris canal near Jersey City, went into operation in June of that year. They obtained their ores both from the mines of red oxide in Sussex county, and from the Saucon valley mines in Pennsylvania. They employed 24 furnaces, built in 3 stacks, of 8 each, in which they were arranged like ovens, half of them opening on one side and half on the opposite side. Each one was about 6 feet in depth (from front to back), 4 feet in width, and

about $3\frac{1}{2}$ feet in height. The roof was arched, with an opening through it for the pipe which conveyed away the vapor and products of combustion. The sole was formed of cast-iron plates, which were perforated full of small holes for admitting the blast to penetrate every portion of the charge, as the wind was driven by two large fan-blowers into the receptacle under the furnace corresponding to the ash-pit. The ores were prepared by first crushing them to powder, which was done by passing them through two pairs of Cornish rolls, and then mixing them thoroughly with about half their weight of the dust of anthracite. A fire was kindled upon the grate-bars of 250 lbs. of pea coal, and when ignited to full whiteness the charge of 600 lbs. of ore, mixed with 300 of coal dust, was added, and when exhausted the charge was withdrawn, leaving only sufficient coal to ignite the next charge, thus working off 4 charges in every 24 hours. The proportion of oxide obtained from the ore was variable, as the charge was not of uniform quality; but it was usually between 30 and 40 per cent. As the coal rapidly consumed from the effect of the blast, the ores were decomposed, and metallic zinc sublimed. The vapor rose with the gaseous products of combustion, and all were carried up the pipe, which just above the roof of the stack terminate under an inverted funnel, the base of which covered the lower pipe like a hood, and the upper portion was a pipe like that below. A strong current of air was created by two exhausting fan-blowers, at the other extremity of the apparatus, and the vapors were drawn up together with much air which flowed in around the open base of the funnel, and caused at this point a vivid combustion of the zinc vapors, which burned with a pale blue flame, and were thus converted into oxide. The appearance presented by this combustion actively going on in full view under each hood was very striking, and was far from suggesting to an observer unacquainted with the process, the possibility that from the pale flames rushing up the pipes any valuable product could be recovered. The pipes connected above with a cylindrical sheet-iron receiver that extended over the three stacks, so as to secure the products of all the furnaces. It was a huge pipe, $6\frac{1}{2}$ feet in diameter, and 130 feet long, and passed along under the roof, against a line of windows on each side, through which air was admitted for hastening the cooling of the products.

The pipe discharged into a square tower in masonry, and in this the particles were washed and cooled by a continual falling sheet of water. The light flocculent oxide of zinc was not carried down by this to any great extent, but was drawn on by the exhaust through 3 large pipes to a second tower with three divisions, in which the fans were placed that created the draught. From this the current, still propelled by the fans, moved on through other pipes that connected with the system of flannel bags, which in great numbers, and of extraordinary sizes, were suspended throughout the portion of the building devoted to the final cooling of the oxide, and filtering it from the gaseous matters intermixed. Some of the bags extended the whole length of the rooms, which were 120 feet long by 64 wide, and the diameter of the largest of them was over 4 feet. They were arranged near together, and some were carried vertically from the horizontal ones up to the roof. Through the pores of the flannel the gases escaped, and the oxide of zinc remained thoroughly purified. Nearly 200,000 square feet of flannel were worked into these bags; and one person was almost constantly employed with a sewing machine, and two others working by hand, in making and repairing them. Along the under side of the horizontal bags pipes of cotton cloth, ten or twelve inches in diameter, reached down nearly to the floor, and were kept tied around their lower ends. These were called the teats; and the oxide of zinc was collected by lifting up the portions of the bags where it had settled, and shaking these so as to make it fall into the teats. The ends of these were then opened, and the white zinc was received in strong bags, which being tied up were laid upon a truck, and this was run by steam power back and forth under a compressing roller. The air dispersed through it, rendering it so light and bulky, was thus expelled, and the oxide was converted into a dense, heavy powder. The last process was to grind this with bleached linseed oil, which was done in the ordinary paint mills. The paint was then transferred into small kegs for the market.

The residuum of the furnace charge, when of red oxide, consisted of some unsublimed zinc ore mixed with franklinite and more or less unconsumed coal. It was raked out in the form of slags, and accumulated in immense piles about the works. In 1853, Mr. Detmold succeeded in using this as an iron ore, and produced excellent iron which proved to be also

well adapted for the manufacture of steel. The iron manufacture has been continued, and has become a profitable branch of the operations of the United States Zinc Company, producing about 2000 tons of zinc per annum. The franklinite itself had been used a year earlier for the same purposes by Mr. Edwin Post, at Stanhope, and from this he obtained both iron and steel; but when the manufacture was undertaken upon a large scale by the New Jersey Franklinite Company, at Franklin, New Jersey, it proved unsuccessful in practice.

The product of the zinc works of the Passaic Company for the year 1856, was 2,327,920 lbs. of oxide of zinc; and the monthly product on for the year 1860 was about 400,000 lbs. from 16 furnaces. With the 24 in blast their monthly capacity was from 280 to 300 tons of 2 000 lbs. to the ton. The total annual product of the three establishments was from 6000 to 7000 tons of oxide. For a few years the zinc paints were popular, and made considerable inroads upon the market for white lead; but the general verdict of intelligent and skilful painters is that they are inferior to the lead both in body and permanency, and their sale has fallen off at least nine-tenths since 1865.

The rate of the importations of zinc, spelter and manufactures of zinc, with the re-exports of the same from 1859 to 1870, both inclusive, were :

	Imported.	Re-exported.
1859.....	\$1,333,112	\$14,912
1860.....	801,258	26,383
1861.....	590,280	19,100
1862.....	254,033	563
1863.....	518,149	4,681
1864.....	675,931	3,973
1865.....	351,876	47,790
1866.....	1,149,895	38,108
1867.....	562,902	3,174
1868.....	561,638	18,028
1869.....	1,197,682	4,022
1870.....	1,003,432	833

The importance of the application of white zinc to painting in the place of white lead appears to have been much more fully appreciated in France and the United States than in Great Britain. Soon after the discoveries of Leclaire that white oxide of zinc could be thus used, and produce, with the colored bases he prepared of this and other innocuous oxides, all the tints required, the French government, recognizing the importance of his inventions, conferred upon him the cross of the Legion of Honor, and adopted the paints for the public buildings. By the year

1849, over 6000 public and private buildings had been painted with his preparations, and the testimony was very strong in their favor. Not one of his workmen had been attacked by the painter's colic, though previously a dozen or more suffered every year from it. The colors were pronounced more solid and durable than the old, were made brighter by washing, and were not tarnished by sulphuretted hydrogen, as occurs to white lead. The best white paint was moreover so pure and brilliant a white, that it made the best white lead paint by its side look disagreeably yellow and gray. No difficulty was experienced in making the new colors, mixed with the prepared oil, dry rapidly without the use of the ordinary dryers of lead compound; and used in equal weight with lead, the zinc was found to cover better, and was, consequently, more economical at equal prices per lb. The English, however, found many objectionable qualities in the new paint. Its transparency, which is the cause of its brilliancy, by reflecting instead of absorbing the light, was regarded as a defect, and the painters complained that it had not the body or covering properties of the carbonate of lead. It would not dry rapidly for the second coat without the use of the patent dryers, which contain lead, and therefore it was no better than the lead. Messrs. Coates & Co., who now import into Great Britain about 1000 tons of oxide of zinc per annum, wrote to the editor of the *Lancet* in March, 1860, that the consumption of white lead is still nearly 100 to 1 of white zinc, and that in 1856 the importation of the latter amounted to only 235 tons. They ascribe the real cause of the larger consumption of white lead, to the almost entire exclusion of zinc, to the fact, that white lead can be adulterated with barytes and other cheap ingredients without the adulteration being detected by the eye, thus securing large profits to the manufacturer and contractor, which cannot be realized in the use of zinc paint, for the reason that it has little affinity for foreign substances. The experience of the manufacturers of the United States does not substantiate this statement as to the difficulty of using the oxide of zinc in mixture with other substances. It is employed not only alone, but mixed with either barytes or white lead, or with both of them; and large quantities are thus sold and give satisfaction to consumers, who would reject the paint, if they supposed it to be any thing else than white lead. As to its

covering quality, it is found that the oxide of zinc varies according to the manner in which it has been prepared. The light flocculent oxide mixes readily with oil without grinding; but though pressed, it covers much less surface than the same oxide moulded when moistened with water, and dried by artificial heat. This preparation also causes any yellowish or greenish tints to disappear, and the article may be supplied to the consumer in cakes, which when ground with oil will cover more surface than the same weight of white lead. The body of the white zinc may be still further improved by calcination before grinding.

The inferior colored sorts of oxide of zinc, such as are collected in the iron receivers near the furnaces, and that made from the pulverized ores of zinc, have been largely employed for painting iron surfaces, especially on board of ships, the paint being found to possess a peculiar quality of protecting the iron it covers from rusting.

Besides its use as a paint, oxide of zinc is applied to the preparation of the mastic for rendering metallic joints tight; and to that of glazed papers and cards, for which white lead and carbonate of barytes have heretofore been used. The French use it in preparing the paste for artificial crystals instead of oxide of lead or other metallic oxides; and they have also made with it some of the finest sorts of cut glass and especially lenses. In the Great Exhibition of 1851, an award was made to specimens of zinc glass which presented a very pleasing and white appearance, and were regarded as especially suited to achromatic purposes. It was remarkable for its being purer and more pellucid than lead glass, and also of greater specific gravity.

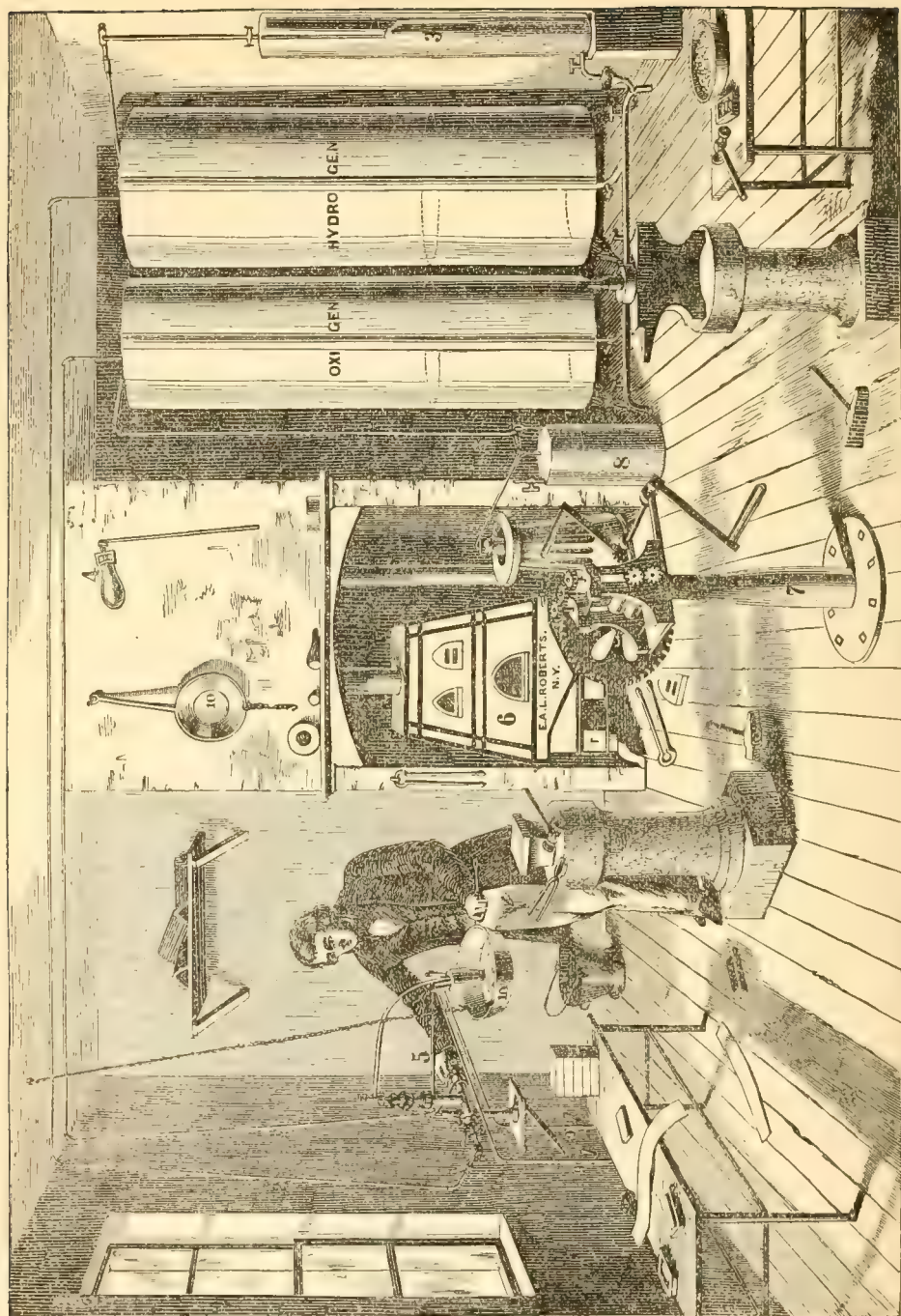
A patent has been granted in the United States for the manufacture of flint glass with oxide of zinc, and specimens of glass were produced with it in 1860, which were remarkable for their brilliancy and beautiful surface, or "skin," as it is called. The glass is more infusible than that made with oxide of lead, and there seems to be no good reason to prevent it coming rapidly into use.

CHAPTER VI.

PLATINUM.

ALTHOUGH this metal is not obtained in large quantity in the United States, it is found associated with the gold in many lo-

calities in California and Oregon, and has been detected in Rutherford county, North Carolina, and in traces in the lead and copper ores of Lancaster county, Pennsylvania. From the states on the Pacific it has been supposed that it would yet be afforded as a commercial article. It is a metal of considerable interest from the extent to which it is used in the United States, and the success that has attended the attempts to work it in Philadelphia and New York. The metal is supplied to commerce from no certain source, and finds its way into the United States in a great variety of forms, as in native grains found in washing the gold deposits of Cauca on the western coast of South America, of Brazil, and Oregon, and in manufactured articles imported from Europe and chiefly from France. Russia produced between the years 1824 and 1845 many times as much platinum as all the rest of the world, and introduced the metal into her coinage; but after 1845 it was no longer coined, and the yield of the deposits in the Ural has dwindled away to almost nothing. The supply from Borneo has been very large for some years, the whole product of the island sometimes amounting to 600 lbs. a year. It is found in small grains and lumps in the sands that are washed for gold; and pieces of several pounds have been met with in Siberia, the largest weighing over 22 lbs. troy. The properties which give to the metal its great value, as its power of resisting the effects of heat and many of the most powerful chemical agents, also render it exceedingly difficult to work and to convert into useful shapes. The crude grains are generally alloyed to the amount of about 20 per cent. of their weight with the very refractory metal iridium, with osmium, rhodium, iron, and sometimes other metals also. It is separated from the chief part of these and purified by dissolving the grains in *aqua regia*, a mixture of nitric and hydrochloric acid, and causing the metal to be precipitated by sal-ammoniac. It falls in a yellowish powder, which is a compound of platinum, ammonia, and chlorine. To decompose this the compound is separated from the liquid, and being well washed and dried, is heated red hot in a cast-iron crucible. This drives off the ammonia and chlorine, and the platinum remains in the crucible in a spongy condition. This is condensed into solid metal by repeated heatings and hammerings. It has always been a matter of great difficulty to raise



sufficient heat to soften the platinum, even in quantities less than an ounce, so that it could be worked under the hammer. It used formerly to be brought into a metallic cake by making a fusible alloy of it with arsenic, and then burning out the latter as much as possible, and hammering or rolling the cake into sheets, but the arsenic remaining in the platinum always injures its quality. Dr. Robert Hare, of Philadelphia, was the first to fuse the metal for any practical purpose, and in May, 1838, he exhibited a cake of about 23 ounces, which was run together from grains and scraps by means of the intense heat produced by his oxy-hydrogen blowpipe. From a reservoir of oxygen, and from another of hydrogen, a gas-pipe conveyed the gases into one tube, in which they were mixed just back of the igniting jets; and in this the explosive mixture was kept cool by ice around the tube. Explosion was moreover guarded against by the extreme fineness of the apertures through which the gases were made to pass.

This means of working platinum has been applied very successfully by Dr. E. A. L. Roberts, of Bond street, New York, in the preparation of platinum plate and various articles in this metal employed by dentists, such as the plates and fastenings for sets of artificial teeth, and the little pins which secure each tooth in its setting. The annual consumption of these last, it is estimated, amounts throughout the United States to about \$60,000 in value, which is nearly $\frac{1}{4}$ of the annual supply of the metal. The apparatus consists of two cylindrical copper gas-holders, one for hydrogen, holding 220 gallons, and one for oxygen, holding 80 gallons. The Croton water, with a pressure of about 60 lbs. upon the square inch, is admitted into the bottom of these gas-receivers, for propelling the gases as they are required. The discharge pipes have each at their extremity a short brass tube, which is full of pieces of wire of nearly the same length as the tube, jammed in very tightly. These unite in another brass tube which is packed in a similar way, and connects by a metallic pipe of only $\frac{1}{4}$ inch bore, with the burner. This is a little platinum box, one end of which terminates in a disk of platinum or copper $\frac{1}{4}$ by $\frac{1}{4}$ inch in size, perforated with 21 very minute holes in 3 rows. This box is buried in plaster of Paris mixed up with fibres of asbestos, forming a lump sufficiently large to contain around the box a receptacle

into which, by means of flexible pipes, a current of water is admitted and discharged on the same principle that the water-tuyeres of iron forges and furnaces are constructed and kept cool while in use. The burner points downward, so that the jet is directed immediately upon the face of the metal held up beneath it. The method of using the apparatus is as follows: the platinum scraps being first consolidated by pressure in moulds into compact cakes of 10 to 20 ounces each, these are placed upon a plate of fire-brick, and brought to a full white heat in a powerful wind furnace. The plate with the platinum is then removed from the furnace and set in a large tin pan thickly lined with asbestos and plaster of Paris, and is brought directly under the jet, which at the same time is ignited. The platinum immediately begins to melt upon the surface, and the pieces gradually run together into one mass as the different parts of the cakes are brought successively under the jet. Though the metal melts and flows upon itself, it cools too rapidly to be cast in a mould; nor is this necessary or desirable for the uses to which it is applied. These require a soft and tough material, while the fused metal is hard and sonorous, and of crystalline texture, breaking like spelter. It is made malleable and tough by repeated heatings and hammerings. It is introduced into the muffle of the assay furnace constructed by Dr. Roberts especially for producing the high heat required in these and similar operations, and is heated so intensely that when the door of the furnace is opened the cake of metal is too dazzlingly hot to be visible. It is then taken out with tongs plated with platinum, and hammered with a perfectly clean hammer upon a clean anvil, both of which should be as hot as possible without drawing the temper of the steel. If the process is one of welding, when the platinum has cooled so as to be distinctly visible, it should be heated again, for in this condition every blow tends to shatter and shake it to pieces. The lump is forged by hammering it to a thickness of about $\frac{1}{4}$ of an inch, and then being again heated very hot, is passed instantly through the rolls. It is thus obtained in sheets, which are easily converted into the various uses to which the metal is applied.

Upon the opposite page, the apparatus employed and manner of conducting the operations are exhibited in the wood-cut;

and the articles designated by the figures are thus explained:—

1. Reservoir for oxygen.
2. " " hydrogen.
3. Hydrogen generator.
4. Oxygen " "
5. Blowpipe.
6. Tuyere.
7. Rolls for converting the metal into sheets.
8. Gasometer.
9. Water pipes.
10. Pan.
11. Moulds in which the loose pieces of metal are compressed.

Crucibles for chemical use are prepared by the ingenious method called spinning. A disk of the metal is securely fixed against the end of the mandrel of a lathe, and, as it revolves rapidly, a blunt point is pressed upon its surface, causing the plate to gradually bend over and assume the desired form. The large platinum retorts used in the manufacture of sulphuric acid are imported from Paris. The whole amount of platinum brought to the United States for the year 1850 was 34,000 oz. troy, which, at the custom-house valuation of \$6.10 per oz., amounts to \$200,000. The importation since that time has been very irregular, but never equal to this. The amount of scraps remelted by Dr. Roberts is about 1000 oz. a year.

IRIDIUM AND OSMIUM.

An alloy of these metals in fine grains of excessive hardness is found very frequently with platinum and with the gold which is refined at the mints. It is of interest from the use to which it is applied in forming the nibs of gold pens; and for this purpose the small grains are purchased by the pen-makers sometimes at the rate of \$250 an ounce. From this quantity they may select from 8000 to 12,000 points of suitable size and shape for use. The alloy is known as iridosmium, and is also very generally called iridium. At some seasons it has been quite abundant in the gold presented at the New York assay office; but recently it is more rare. As it does not fuse and alloy with the gold, it appears in specks upon the bars of this metal. The method of separating it is to melt the gold with a certain portion of silver, as in the usual refining process. The alloy thus obtained being less dense than the melted gold, the particles of iridium settle in the lower portions; the upper is then ladled off, and the metals are parted. More of the

impure gold is added, and the process thus goes on till a considerable amount of iridium is concentrated into the alloy of gold and silver, from which it is at last obtained by dissolving these metals. According to the statement of Dr. Thèvenet published in the *Annales des Mines* (vol. xvi., 1859), iridium is collected at the gold-washings along the sea-coast of Oregon, and is sometimes quite equal in quantity to the gold. He describes it as white, glistening, very heavy, its specific gravity being 20 to 21, very hard, and resembling sand, its angles slightly flattened and rounded by friction. It is accompanied by platinum and rhodium. After one of the storms that prevail along this coast, the miners at low tide collect the black sand and carry it to the washing and amalgamating apparatus, in which it is stirred with mercury and then treated upon the shaking tables. Though by their rude processes they probably lose $\frac{1}{4}$ of the precious metals, they sometimes collect several ounces a day of gold to the man. Near Fort Orford, to the north of Rogue River, about 15 per cent. of iridium is found with the gold. Still further north, between Cape Blanco and Coquille, the metals collected consist of about 45 per cent. iridium and 5 per cent. platinum. Between Randolph and Cape Arago the metallic grains are very light and in extremely thin scales; they consist of 70 per cent. iridium and 6 per cent. platinum. Further north, the iridium continues almost as abundantly, but mostly in very fine particles. One piece was shown to Dr. Thèvenet as a great curiosity which was as large as a grain of rice. In sifting more than 50 lbs. of iridium, he states that he had not seen a single specimen of one quarter this size.

CHAPTER VII.

MERCURY.

THIS metal, which is extensively employed in the arts, especially in the treatment of gold and silver ores by amalgamation, in the combination of amalgams for coating mirrors, etc., in the construction of barometers and thermometers, and other philosophical instruments, in the manufacture of the paint called vermilion, for several medicinal preparations, and for a variety of other purposes, was not classed among the productions of the United States until after the acquisition of Califor-

nia, when mines of its principal ore were opened, which have been extensively worked, as will be described below. Mercury, which is the only fluid metal, is found both in a native state, dispersed in drops among the slates that contain the veins of its ores, and also occurs in combination with sulphur in the ore called cinnabar, a compound of one atom of mercury and one of sulphur, or of 86.2 per cent. of the former, and 13.8 per cent. of the latter. Some other natural compounds are known, which are not, however, of much importance. Cinnabar is almost the exclusive source of the metal. This is a very heavy, brilliant ore of different shades of red; is readily volatilized at a red heat, giving off fumes, when exposed to the air, both mercurial and sulphurous; but in tight vessels it sublimes without decomposition, and if lime or iron be introduced with the ore into retorts, the sulphur is retained in combination with the new element, and the mercury escapes in vapor, which may be condensed and recovered in the metallic state. On this principle the process for collecting mercury is based. The ores of mercury are found in almost all the geological formations, but the productive mines are only in the metamorphic or lowest stratified rocks, and in the bituminous slates of the coal measures.

In order to appreciate the importance of the mines of California, it is necessary to understand the extent of the demand for this metal, and the sources which have supplied it. From the time of the ancient Greeks and Romans, mercury has been held in high estimation, and has been furnished from the same mines, which have ever since produced the chief part of the product of the world. Pliny states that the Greeks imported red cinnabar from Almaden in Spain, 700 years before the Christian era, and in his own time it was brought to Rome from the same mines to the amount of 700,000 lbs. annually. In modern times the production amounts to 2,700,000 to 3,456,000 lbs. per annum, and is chiefly obtained from two veins, one about 2 feet, and the other 14 feet thick, which, meeting in a hill about 125 feet high, spread out to a thickness of nearly 100 feet. The ores are of small percentage, yielding about $\frac{1}{10}$ only of mercury. The greatest depth of the workings was only about 330 yards several years ago. After the metal has been extracted from the ores, it is packed in iron bottles or flasks holding 76½ lbs. each, and is taken to Cadiz for shipment. For

many years past, the lessees from the Spanish government, in whom the title is vested, have been the Rothschilds and other bankers of Europe; but their contracts with the government have varied from time to time, thus affecting the price at which the product was held.*

The mines next in importance have been those of Idria in Carniola, belonging to the Austrian government. These, for some years previous to 1847, had produced an annual average of 358,281 lbs. of mercury, and since that time, the production has varied, sometimes reaching 600,000, and even over 1,000,000 lbs. per annum. The other mines of Europe do not probably produce 200,000 lbs. On the American continent many localities of the ores have been worked to some extent; but although the consumption is very great at the silver mines of Mexico, amounting, as estimated by Humboldt, to 16,000 quintals of 200 lbs. each, three fourths of the supply was then derived from the European mines. In 1782, mercury was even brought to South America from China, where it was formerly largely extracted in the province of Yunnan. Yet in the early years of the Spanish conquest Peru was a large producer of the metal, its most important mines being in the province of Huancavelica, where no less than 41 different localities of the ore have been known; but at present the whole product of the country is supposed not to exceed 200,000 lbs. A large portion of this product is from the Santa Barbara, or the "Great Mine," which has been worked since 1566. The mines of Chili and the numerous localities at which the ores have been found in Mexico supply no metal of consequence. Dumas estimated, not long since, the total annual production as follows:—

	lbs. avoirdupois.
Almaden, Spain.	2,700,000 to 3,456,000
Idria.	648,000 " 1,080,000
Hungary and Transylvania. .	75,600 " 97,200
Deux Ponts.	42,200 " 54,000
Palatinate.	19,400 " 21,600
Huancavelica.	.. 324,000
California.	.. 2,000,000
Total.	7,032,800

*In 1839 the royalty demanded by the government was \$59 per quintal of 106 lbs., to which it had reached by successive advances from \$51.25; and in 1843 it had advanced to \$82.50 per quintal. The opening of the California mines soon caused this to be considerably reduced.

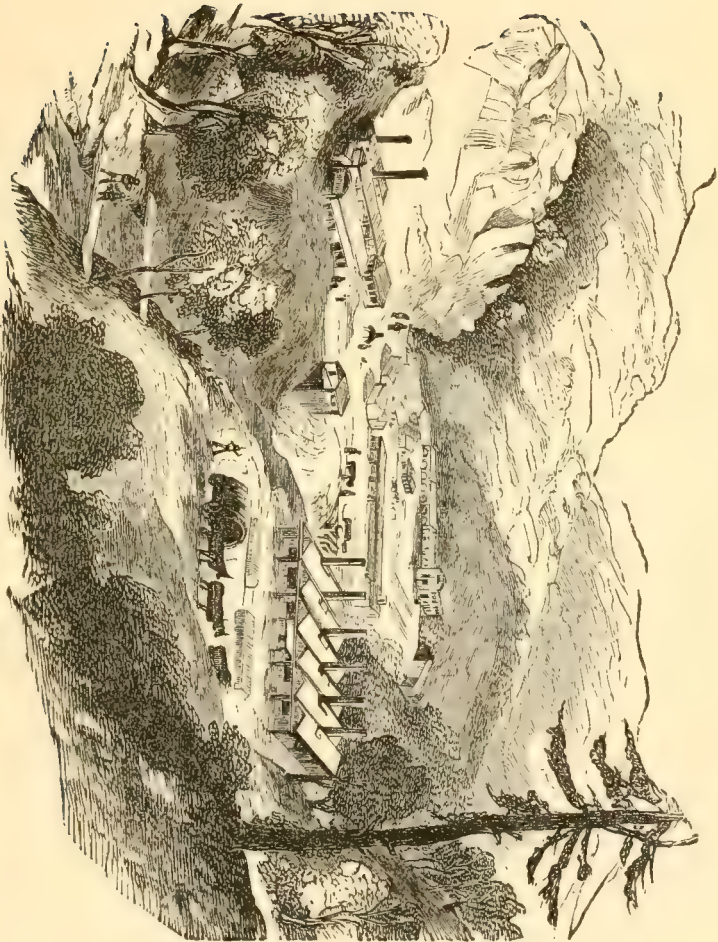
In California the existence of large quantities of cinnabar was known long before the real character of the ore was understood. It was found along a range of hills on the southern side of the valley of San José, about 60 miles south-east from San Francisco. For an unknown period the Indians had frequented the locality, coming to it from distant places, even from the Columbia river, to obtain the bright vermilion paint with which to ornament their persons. With rude implements, such as the stones they picked from the streams, they extracted the ore from the flinty slates and shales in which it was found, and in their search for it they excavated a passage into the mountain of about sixty feet in length. In 1824 the attention of the whites began to be directed to this curious ore, and some of the Mexicans sought to extract from it gold or silver. Other trials made of it in 1845 resulted in the discovery of its true character, and operations were thereupon commenced to work it by one Andres Castillero. Owing, however, to the disturbed state of the country, little was done until 1850, when a company of Mexicans and English engaged vigorously in the extraction and metallurgical treatment of the ore, and established the mine which they called the New Almaden. In 1858 a stop was put upon their further proceedings by an injunction issued by the United States court on the question of defective title. From the testimony presented in the trial, it appeared that the company in the course of eight years had produced full 20,000,000 lbs. of metal, and realized a profit of more than \$1,000,000 annually. The Americans who claimed the mine directed their attention to the discovery of new localities of the ore, and succeeded in finding it upon the same range of hills within less than a mile of the old workings. Here they opened a new mine in December, 1858, which they named the Enrequita, and in June, 1860, a company was formed in New York for working it under the name of the "California Quicksilver Mining Association." The following are the returns of their operations to the latest dates: in September, 1859, the product of mercury was 14,400 lbs.; October, 28,650; November, 27,525; December, 28,425; January, 1860, 27,000; February, 16,950; March, 25,500; April, 33,700; May, 46,275; June, 48,750; July, 50,000; August, 79,866; September, 66,096. The

increase of production, hereafter, will be limited rather by the capacity of the reducing apparatus than by that of the mine. Twenty-four retorts for distilling the mercury are now in operation, 6 of which have been started since August, 1860. From the report of October 11, 1860, it appears that a new vein has also been opened, in which 20 men are employed, working in solid cinnabar without having encountered the boundary walls of the lode. The total expenditure for mining, for machinery, etc., up to October 15, 1860, had amounted to \$275,000, all of which has been paid out of the proceeds of the mine, leaving a considerable balance on hand. The company owns another mine also, called the Providencia, which has produced some cinnabar.

The operations at the Enrequita mine are carried on from the face of the hill, some 5 or 6 levels one above another being carried into the mountain up and down its slope. The most extensive of these is the adit level at the base, which is about 600 feet long. Shafts are sunk from this to the depth of about 50 feet; but the principal workings are in the upper levels for 300 feet over the adit. These are exceedingly irregular, owing to the unequal distribution of the ore through the argillaceous slates. It lies in beds included between the strata of these lower silurian rocks, dipping with them at a very steep angle, and winding with the contortions of the strata. The workings follow the bunches of ore as they lead up or down, and to the right or left. Shafts occasionally penetrate from one level to another, but no regular system of working appears to have been adopted. With the cinnabar is intermixed some arsenical iron and copper pyrites, and the ore and slates are both traversed by veins of carbonate of lime, some of which are retained in hand specimens of the cinnabar.

On the same range of hills, at its western extremity, the Santa Clara Mining Company, of Baltimore, has opened a mine called the Guadalupe, the product of which for the year 1860 was about 200,000 lbs.

The total production of the quicksilver mines, from the beginning of 1853 to the close of 1858, was about 177,578 flasks, or 13,318,350 lbs. In 1866, the California mines produced 3,505,878 lbs., and in 1867, 3,840,957 lbs. Litigation has prevented most of them from being fully worked.



NEW ALMADEN QUICKSILVER MINE.

METALLURGIC TREATMENT.

From cinnabar not contaminated with strange metals, the method of obtaining the fluid mercury is very simple. In the early workings of the New Almaden mine, the clean ores were placed in the common "try pots," such as are used by the whalers, and a cover being tightly luted on, a fire was started under them, and the mercurial vapors escaped through a tube inserted in the lid and were condensed in cold vessels. Afterward furnaces were constructed in brick-work upon a large scale, each one provided with a chamber or oven 7 feet long, 4 feet wide, and 5 feet high, corresponding to the chamber of the reverberatory furnaces; and into this was introduced a charge of 10,000 lbs. of clean ore separated from the poorer portions after the whole had been broken up. With the ore was mixed a portion of lime to combine with and retain the sulphur. A partition of brick-work separated the oven from the fire-room, and the bricks in this partition were so laid as to leave open spaces for the flame from the burning wood to pass through. On the opposite side of the oven another partition separated this from a chamber of its own size, the only communication between them being by a square hole in one of the corners close to the roof. This chamber connected with another by an opening in the opposite corner near the floor, and this arrangement was extended through eight chambers. Between the last one and the tall wooden flues through which the smoke and vapors finally passed out into the open air was placed a long wooden box provided with a showering apparatus. As the cinnabar was volatilized by the flame playing over the charge, the vapors were carried through the condensing chambers, depositing in each a portion of mercury, and in the showering box they underwent their final condensation. From the bottom of each chamber the metal flowed in gutters to the main conduit which led to the great iron reservoir sunk in the ground. From this it was poured into flasks through brushes which intercepted the scum of oxide of mercury. The method proved very wasteful, from the leakage of the vapors through the brick-work; and it has been abandoned for an improved process, in which the pulverized ores mixed with quicklime are charged into large cast-iron retorts very similar in their form and setting to those employed at the

gas-works. Three are set together in a bench of brick-work, and each one is furnished with an eduction pipe inserted in the end and leading down into water contained in a large cylindrical condenser of iron. This is placed along the front line of the furnace, so as to receive the vapors from all the retorts. The mercury, as it is condensed, falls down to the bottom, and is let out through a pipe by a contrivance that prevents the water flowing with it from the condenser. At the Enrequita mine each bench of three retorts requires a little over a cord of oak wood a day for heating. Four benches, in operation from September, 1859, employed 6 men in charging and discharging, working in 2 shifts of 3 men, besides 3 firemen, each working 8 hours. Two men besides these were employed in mixing the ores for the retorts. In June, 1860, the production of these furnaces, from 1000 cargas of ore of 300 lbs. each, was about 50,000 lbs., or about 17 per cent.

In conducting the furnaces, the workmen are seriously affected by inhaling the mercurial vapors. They are sometimes even salivated, and are often obliged to abandon the business for a time. The horses and mules also suffer from the noxious fumes, and many are lost in consequence. But no injurious effects are experienced among those employed in the mines, the cinnabar being always handled with impunity.

The view of the works presents their appearance in 1852, as sketched by J. R. Bartlett, Esq. It was first published in his "Personal Narrative" (New York, 1854).

USEFUL APPLICATIONS OF MERCURY.

The principal uses to which mercury is applied have already been named. The largest quantities are consumed in working gold and silver ores. The principle of the amalgamating process is explained in the account of the treatment of gold ores. In the arts amalgams are applied to many useful purposes, of which the most important is coating the backs of looking-glass plates with tin amalgam. Silver was originally employed instead of tin, and the process is still called "silvering." It is conducted at several establishments in the United States on the old Venetian plan, which has been in use for 300 years. The largest mirrors are prepared by Messrs. Roosevelt & Sons, in New York, from the French plates which they import. The process is a simple one,

but is attended with some difficulties arising from the imperfections which will sometimes appear upon the coating, notwithstanding the particular care taken to avoid them. The health of the workmen also suffers, so that they cannot pursue the business more than a few years. The only precaution taken to protect them from the effects of the mercury is thorough ventilation. Frequent use of sulphur baths also is very beneficial. The method of silvering is as follows: tables are prepared of stone made perfectly smooth, with grooves sunk around the edges. These are set horizontally, but can be raised a little at one end by a screw. Each table is covered with tin-foil carefully spread out over a larger surface than the plate will cover, and slips of glass being laid around three of the sides, the mercury is poured on till it covers the foil to the depth of about $\frac{1}{4}$ of an inch. Its affinity for the tin, and the slips of glass, prevent its flowing off. The glass plate rendered perfectly clean is then slid along the open side, the advancing edge being kept in the mercury, so that no air nor oxide of the metal can get between the plate and the amalgam. The plate, when in place, is secured and pressed down by weights laid upon it, and the table is raised a little to allow the excess of mercury to trickle off by the grooves and collect in a vessel placed on the floor to receive it. After remaining thus for several hours, the plate is taken off and turned over upon a frame. After several weeks the amalgam becomes hard, and the glass may then be set on edge.

Amalgams of the precious metals are used for what are called the water-gilding and water-silvering methods of gilding and silvering applied to buttons and various other metallic articles. These, being made chemically clean, are washed over with the amalgam contained in a large excess of mercury, and are then placed in a furnace and heated till the mercury is driven off by the heat, leaving a thin film of the precious metal, which may then be burnished.

Mercurial medicines, as calomel, (the chloride,) and blue mass, which is the metal reduced to fine particles by long-continued trituration, and incorporated with twice its weight of confection of roses and liquorice root, are very largely prepared, especially for the southern and western states and the West India islands. The labor of triturating the mercury for blue mass has led to the in-

troduction of ingenious machinery for the purpose, invented by Mr. J. W. W. Gordon of Baltimore, and by Dr. E. R. Squibb of Brooklyn, and worked by the latter at his pharmaceutical laboratory by steam power.

CHAPTER VIII.

SILVER—COBALT—NICKEL—CHROME—MANGANESE—TIN.

BUT few other ores of much importance are found in the United States, besides those of which accounts have been given; and it remains to describe the occurrence and applications of the ores of those metals only which are comprised in the heading of this chapter.

SILVER.

The occurrence of this metal in the United States is chiefly limited to some of the lead ores; and in very few of these, as noted in the chapter upon lead, has it been found in sufficient quantity to justify the working of the mines and separation of the silver. The Washington mine in Davidson co., N. C., is still worked with moderate success for both metals; but the only promising silver mines are those of Arizona, near the Gila river in New Mexico, and the Washoe mines on the extreme western verge of the Utah territory.

In the territory of Arizona, especially in that portion of it ceded to the United States under the Gadsden treaty, are numerous mines productive in silver, some of which were worked when the territory belonged to old Spain. These are now attracting the attention of Americans, and in 1859 and 1860, companies were organized in Cincinnati, New York, and St. Louis, for exploring and working them. The principal mine is that of the Sonora Company, of Cincinnati. The locality is about 75 miles south of Tucson, and about 270 miles north of Guaymas, which is the chief port of the Gulf of California. Several mines in the vicinity were formerly worked by the Mexicans for silver, and abandoned in consequence of Indian depredations and political troubles. The Sonora Company commenced operations in 1858 upon a new discovery, and have produced a considerable amount of silver, reduced from the ores at their works, at Arivaca, 7 miles from the

mines. Seventy miles north of Tucson, operations were commenced in 1860, in another locality, on the same mining range, by a company organized in New York, called the Maricopa Mining Company. Their mine affords rich argentiferous copper ores, samples of which have been brought to New York, and assayed by Prof. John Torrey, and other chemists. They proved to be vitreous copper, associated with carbonates, and yielded an average of over 50 per cent. of copper. The metal contained variable amounts of silver, worth from \$40 to \$80 per ton. Gold was also detected in it. The outlet for this is also by Guaymas, 420 miles distant, through a region easily traversed by wagons, and upon long-established routes. The cost of transportation, by contracts of Mexicans, is at the rate of 54 cents per lb., for the whole distance. In the vicinity of the mines, on the Gila river, it is proposed to reduce the ores. The region is on the Pacific slope of the range of the silver mining districts of Sonora and Durango, and its rock formations are granitic and metamorphic, traversed by dikes of trap, and containing beds of quartz.

On the Rio Mimbres, 240 miles east of Tucson, are the Santa Rita del Cobre and Mimbres mines, from which 333,000 lbs. of copper are reported as having been delivered in New York in 1860. The metal was smelted at the mines, transported through Texas to Port Lavacca, and thence to New York. Whether the ores contain silver or not, is not known. Besides the operations above named, others are in progress in Arizona, of which we have no details. The region is described in the "Personal Narrative" of J. R. Bartlett, Esq., and in the Congressional Pacific Railroad reports.

The Washoe ores are argentiferous galenas of richness varying between great extremes, some of the best sorts which have been shipped to New York, and thence to England, containing enough silver to give them a value of \$2000 per ton. The mines are in the inferior range of hills along the eastern base of the Sierra Nevada, and are met with over an extensive territory in the valley of the upper portion of Carson's River and many miles beyond this to the north. Those of most importance are in the vicinity of several new towns, called Virginia City, Silver City, Carson City, etc., about 160 miles north-east from Sacramento. From that point the crest of the Sierra Ne-

vada is reached in 100 miles, nearly due east, and the remaining 60 miles is down the valley of Carson's River. The discoveries of the silver ores were made the latter part of the year 1859, but it was known before this that gold existed in the valley, and that the value of this metal was deteriorated by the silver with which it was usually alloyed. The opening of permanent veins of silver ores produced a great excitement throughout California, and led to an extraordinary emigration to the new mining district, and rapid development during the year 1860 of its resources. The considerable number of mines already in operation, upon veins of unquestionable permanency, and the great richness of some of the ores, together with the variety of those already found, leave no room for doubting that this is a mining region of great importance, and must largely add to the metallic productions of the extreme western states.

The ores, on account of their complex character, are difficult to reduce with economy, and the ordinary methods of obtaining the lead fail, when applied to compounds like these, which contain a large proportion of silica, from which the galena cannot be mechanically separated. The German method of treating such ores, employed at Clausthal, is to reduce them in small blast furnaces, with a flux of granulated cast iron, or of iron turnings, admitting only air enough to keep up the combustion of the fuel. The lead and silver are set free by the sulphur of the ore combining with the iron, and the formation of infusible silicates of oxide of lead is prevented by guarding against the oxidation of lead, through too great access of air. The separation is, however, very imperfect in a single operation, and the rich slags obtained are roasted in order to convert the sulphuret of iron into oxide of iron, which, combining with the silicates of the scoria, forms very fusible compounds, which are then returned to the furnace mixed with fresh charges of ore. The silver goes with the lead, and is separated by cupellation.

COBALT.

The ores of this metal are of rather rare occurrence, and are applied to practical purposes not to furnish the metal but its oxide, which is of value for its property of giving a beautiful blue color to glass with which it is melted, and of producing other fine colors when mixed with some other sub-

stances. The ores are sought for all over the world for the supply of the British manufacturing of porcelain, stained glass, etc. They are chiefly combinations of cobalt with arsenic, sulphur, and sometimes with nickel and iron. The compound known as smaltine, or arsenical cobalt, was obtained at Chatham, Conn., as far back as 1787, and the mine has been worked for cobalt at different times in the present century. The cobalt in the ore is associated with about an equal amount of nickel, and its proportion is said to have been less than two per cent. Cobaltine, which is a compound of sulphur 19.3 per cent., arsenic 45.2, and cobalt 35.5, is the most productive ore of this metal, but is not met with in this country. Varieties of pyritous cobalt have been found in Maryland in quantities too small for working; and also at Mine la Motte in Missouri, associated with a black earthy oxide of cobalt and black oxide of manganese. In other places, also, oxide of cobalt, in small quantity, is a frequent accompaniment of manganese ores. Mine la Motte has furnished a considerable amount of the cobalt oxide, but the beds in which it is found are not of permanent character, and are so far exhausted as to be no longer worked with profit. A similar ore, accompanied with nickel, appears to be very abundantly distributed among the talcose and quartzose slates in Gaston and Lincoln counties, North Carolina. It is thrown out with a variety of other ores, as galena, blende, titaniferous iron, etc., in working the gold mines of this region; and it is mixed among the great beds of hematite, found in the same district, which are the product of the decomposition of beds of pyritous iron. In some places it is so abundant that the strata containing it are conspicuous where the roads pass over them, by the blackness of the gossan (decomposed ore) or wad. Prof. H. Wurtz, who describes these localities (see "American Journal of Science," 2d series, vol. xxvii., p. 24), is of opinion that the earthy oxide of cobalt is the gossan of the sulphuret of this metal, existing unaltered in the rocks below.

Oxide of cobalt, obtained in a crude state from the washed arsenical ores, is known as zaffre or saffor, and in this condition it is a commercial article. It is refined by separating the arsenic, iron, and other foreign substances, by precipitating them from the solution in hydrochloric acid; and the oxide is finally obtained by precipitating with

chloride of lime, and heating the product to redness. Smalt is a preparation of cobalt largely used in the arts as a coloring material, and consists of silicate of potash and cobalt. It is in fact a potash glass colored by silicate of cobalt, and is prepared as follows: Zaffre is melted in pots, with suitable proportions of pure sand and potash and a little saltpetre. The other metals combine together and sink in a metallic mass, which is called speiss. The glass containing the oxide of cobalt is ladled out and poured into water to granulate it, and is then ground to powder. This being introduced into vats of water, the colored glass subsides in deposits, which gradually diminish in their proportions of oxide of cobalt. The first are of the deepest blue, and are called azure; but of this, and of the succeeding fainter shades, there are many varieties, distinguished by peculiar names. When finely powdered, smalt is applied to coloring wall papers, and blueing linen, besides being incorporated with porcelain to impart to it permanent blue shades. The great value of oxide of cobalt, amounting to several dollars per lb., renders it an important object to fully develop the resources of the country in its ores, as well for export as for domestic use. In 1856 there were imported into Great Britain 428 tons of cobalt ore, and 34 tons of oxide of cobalt.

NICKEL.

Nickel is a metal of some commercial importance, and is employed chiefly for producing, with copper and zinc, the alloy known as German silver. The proportions of these metals are not constant, but the most common in use are eight parts of copper to three each of nickel and zinc. The larger the proportion of copper, the more easily the plates are rolled; but if more is used than the relative amounts named, the copper soon becomes apparent in use. The new cent contains 12 parts of nickel to 88 of copper, and the manufacture of this adds somewhat to the demand. The metal has been mined at Chatham, Conn., and is met with at Mine la Motte and other localities where cobalt is found. It occurs in greatest abundance at an old mine in Lancaster county, Penn., where it is associated with copper ores. The mine was originally worked for copper, it is said, more than one hundred and thirty years ago, and was reopened for supplying nickel for the U. S. Mint, on the introduction of

the new cent in 1857. The sulphuret of nickel, containing, when pure, 64.9 per cent. of nickel, and 35.1 per cent. of sulphur, is in very large quantity, in two veins of great size, one of which has been traced over 600 feet, and the other over 900 feet in length. In 1859 it was producing at the rate of 200 tons of nickel ore and ten tons of copper ore per month. A pyritous variety of nickel ore, called siegenite, is found at Mine la Motte, Missouri, and in Carroll county, Maryland. In Gaston and Lincoln counties, North Carolina, similar ore was found by Prof. Wurtz, as noticed in the remarks on cobalt, above.

CHROME OR CHROMIUM.

The ore of this metal, known as chromic iron or chromate of iron, has been mined for many years in the United States, both for exportation and domestic use. It is the source whence the chrome colors are obtained that are largely used in the arts, especially in dyeing and calico printing. The name of the metal, from a Greek word meaning color, was given in consequence of the fine colors of its compounds. It usually consists of the sesquioxide of chromium in proportion varying from 36 to 60 per cent., protoxide of iron from 20 to 37 per cent., alumina sometimes exceeding 20 per cent., and more or less silica, and sometimes magnesia. Its value consists only in the first-named ingredient. The localities of the ore are in the serpentine rocks of different parts of the United States, as in the Bare Hills, near Baltimore, and near the Maryland state line on the southern edge of Chester and Lancaster counties, Pennsylvania. In small quantities the ore is met with at Hoboken, Staten Island, and other places near New York city. It is found in several towns in Vermont, but the largest veins of it are in Jay, in the northern part of the state. The composition of this ore was found by Mr. T. S. Hunt to be 49.9 of green oxide or sesquioxide of chromium, 48.96 of protoxide of iron, and 4.14 per cent. of alumina, silica, and magnesia. Though the quantity of the ore in this region is reported to be large, the principal supplies of the country have been obtained in Maryland, and from the mines just over the state line in Pennsylvania. The ore, as recently as 1854, was found in loose fragments among the disintegrated materials of the serpentine upon the tracts called the barrens, and was gathered up from the val-

leys and ravines, and dug out in sinking shallow pits and trenches over the surface. The ore thus obtained was called "sand chrome," and for a time it had been worth \$45 per ton, and thousands of tons had been collected and shipped, principally to Baltimore. At the period named these superficial deposits were mostly exhausted, and the value of the ore was only about \$25 per ton. This, however, was sufficient to sustain regular mining operations, which were then carried on upon the veins found in the serpentine, a little west of the east branch of the Octorara Creek. Wood's chrome mine, near the Horse-shoe Ford, was at that time about 150 feet deep, and the workings had been extended north-east and south-west about 300 feet, upon an irregular vein of chrome ore, which lay at an inclination of about 45° with the horizon toward the north-west. The ore, in places, formed bunches, which attained a width of 20 feet, and then thinned away to nothing. Four men obtained from the mine 7 or 8 tons of excellent ore a day, the best of which was directly placed in barrels for the foreign market, and the poorer was dressed and washed for the Baltimore, and other home markets. The state line mine, in the same vicinity, worked to about the same depth, had produced several thousand tons. The supplies of this ore are always of uncertain continuance.

USEFUL APPLICATIONS.—Chromate of iron is used chiefly in the production of chromate of potash, and from this the other useful chromatic salts are obtained. The object in view in the chemical treatment of the ore is to convert the sesquioxide of chromium into the peroxide or chromic acid, and cause this to combine with potash. This may be effected by various methods, as by exposing a mixture of the pulverized ore and of saltpetre (nitrate of potash) to a strong heat for some hours. The chrome is peroxidized at the expense of the oxygen of the nitric acid of the saltpetre, and the chromic acid combines with the potash; or if the ore is mixed with carbonate of potash and calcined, the peroxidation of the chrome is effected by admission of air into the furnace, and the same product is obtained as in the employment of saltpetre. The introduction of lime hastens the operation. Other mixtures also are used for the same purpose. When the calcined matter, having been drawn out from

the furnace, is lixiviated with water, the chromate of potash is dissolved and washed out, and is afterward recovered in the form of yellow crystals on evaporating the water. From chromate of potash the other salts are readily produced. Chrome yellow, used as a paint, is prepared by mixing chromate of potash with a soluble salt of lead, and collecting the yellow precipitate of chromate of lead which falls. A bright red precipitate is obtained by thus employing a salt of mercury, and a deep red with salts of silver. Chrome green is produced by mixing Prussian blue with chrome yellow. Some new and very interesting compounds of the sesquioxide of chromium with different bases have been recently obtained by Prof. A. K. Eaton of New York, and in consequence of their decided colors and the extraordinary permanency of these against powerful reagents applied to remove them, the salts were employed for printing bank-notes. Though they proved to be all that was required as to the colors themselves, the steel plates were so rapidly cut by the excessively sharp and hard powders, however finely they were ground, that it was found necessary to abandon their use. The new salts were chromites—that of iron having a dark purple color; of manganese, a lighter shade of the same; of copper, a rich blueish black; of zinc, a golden brown; of alumina, a green, somewhat paler than that of the sesquioxide.

MANGANESE.

Though this is a metal of no value of itself, one of its ores, called pyrolusite, is a mineral of some commercial importance, chiefly on account of the large proportion of oxygen it contains, part of which it can be easily made to give up when simply heated in an iron retort. The composition of pyrolusite, or black oxide of manganese, is 63.4 per cent. of manganese, and 36.6 per cent. of oxygen. It is a hard, steel-gray ore, resembling some of the magnetic iron ores, and is often found accompanying iron ores, especially the hematites. In the United States it is met with in various localities along the range of the hematites, from Canada to Alabama, and has been mined to considerable extent at Chittenden and Bennington, Vermont; West Stockbridge and Sheffield, Mass.; on the Delaware river, and near Kutztown, Berks co., Penn.; and abounds in different parts of the gold region,

as on Hard-labor Creek, Edgefield District, S. C. Usually the ore is found in loose pieces among the clays which fill the irregular cavities between the limestone strata; its quantity is of course very uncertain, and its mines are far from being of a permanent character. Oxide of iron is commonly mixed with the manganese ore, reducing its richness, and at the same time seriously injuring it for some of the purposes to which it is applied. As obtained from the mines, the assorted ore is packed in barrels and sent to the chemical establishments, where it is employed principally in the manufacture of chloride of lime or bleaching powder. For this purpose the pulverized black oxide of manganese is introduced into hydrochloric acid, and this being heated a double decomposition takes place, a portion of its chlorine is expelled, and the hydrogen that was combined with it unites with a part of the oxygen of the pyrolusite. The chlorine, which it was the object of the process to obtain, is then brought in contact with hydrate of lime, and uniting with the calcium base, forms the bleaching powder. A similar result is obtained by mixing the oxide of manganese with chloride of sodium (common salt), and adding sulphuric acid. By these operations a weight of oxygen equal to about one third that of the pure ore may be obtained, and this may be applied to any of the purposes for which oxygen not absolutely pure is required. Black oxide of manganese is also used to decolorize glass stained green by the presence of the protoxide of iron. Its own amethystine tint is supposed to neutralize the optical effect of the greenish hue of the iron. Pure pyrolusite, free from iron, might be shipped to profit to Liverpool, where it is worth \$35 to \$40 per ton, but inferior ore would involve bills of cost. The chemically prepared permanganate of potassa has come into extensive use as an anti-septic, of late years.

TIN.

The very useful metal, tin, is not one of the products of this country, and there is no encouragement for hoping that its ores will ever be found in workable quantity. Its presence has been recognized in a few small crystals of oxide of tin, found in Chesterfield and Goshen, Mass., and it has been detected as a mere trace in the iron ores of the Hudson, and iron and zinc ores of New Jersey; it is also associated with some of

the gold ores of Virginia. In the town of Jackson, N. H., is a vein of arsenical iron, containing thin streaks of oxide of tin. There have been discovered, also, some of the tin ores though not as yet in large quantity in Maine, in Missouri, in Texas, and in California. The last named, it is thought, may yet furnish considerable supplies. Tin is imported chiefly from the mines of Cornwall, England, and from Banca, and other islands of the Malay archipelago. The United States is one of the largest consumers of tin, sheet tin having been applied, through the ingenuity of the workers of this article in Connecticut, to the manufacture of a variety of useful utensils. What is called sheet tin is really sheet iron coated with a very thin layer of tin. The sheets are prepared in England by dipping the brightened iron sheets into a bath of melted tin. The process has been applied to coating articles made of iron, which are thus protected from rusting; and tin is also used for similar purposes. Such are stirrups, bridle-bits, etc. Cast-iron pots and saucepans are tinned on the inside by melted tin being poured in and made to flow over the surface, which has been made chemically clean to receive the metal. The surface is then rubbed with cloth or tow. Tin is imported in blocks or ingots, and the metal is applied to the preparation of various alloys, as bronze or bell-metal, composed of copper and tin in variable proportions, commonly of 78 parts of copper, and 22 of tin; gun-metal, copper 90, and tin 10; pewter, of various proportions of tin and lead, or when designed for pewter plates, of tin 70, antimony 8, bismuth 2, and copper 2; and soft solder, consisting of tin and lead, usually of two parts of the former to one of the latter. Bismuth is sometimes added to increase the fusibility of the alloy.

CHAPTER IX.

COAL.

To the early settlers of the American colonies the beds of mineral coal they met with were of no interest. In the abundance of the forests around them, and with no manufacturing operations that involved large consumption of fuel, they attached no value to the black stony coal, the real importance of which was not in fact appreciated even in

Europe until after the invention of the steam engine. The earliest use of mineral coal was probably of the anthracite of the Lehigh region, though it may be that the James River bituminous coal mines, 12 miles above Richmond, were worked at an earlier period than the Pennsylvania anthracites. The region containing the latter belonged to the tribes of the Six Nations, until their title was extinguished and the proprietary government obtained possession, in 1749, of a territory of 3750 square miles, including the southern and middle of the three anthracite coal-fields. In 1768 possession was acquired of the northern coal-field, and at the same time of the great bituminous region west of the Alleghany mountains. The existence of coal in the anthracite region could not have escaped the notice of the whites who had explored the country, for its great beds were exposed in many of the natural sections of the river banks and precipitous hills, and down the mountain streams pieces of coal, washed out from the beds, were abundantly scattered. The oldest maps now known, dating as far back as 1770, and compiled from still older ones, designate in this region localities of "coal;" but these were probably not regarded as giving any additional value to the territory. The first recorded notice of its use was in the northern basin by some blacksmiths in 1770, only two years after the whites came in possession; and in 1773 a boat load of it was sent down from Wilkesbarre to the Continental armory at Carlisle. This was two years after the laying out of the borough of Wilkesbarre by the Susquehanna Land Company of Connecticut. From this time the coal continued to be used for mechanical operations by smiths, distillers, etc.; and according to numerous certificates from these, published in 1815, in a pamphlet by Mr. Zachariah Cist of Wilkesbarre, they had found it very much better for their purposes, and more economical to use than Virginia bituminous coal, though at the enormous price of 90 cents a bushel. Gunsmiths found it very convenient for their small fires, and one of them, dating his certificate December 9, 1814, stated that he had used it for 20 years, consuming about a peck a day to a fire, which was sufficient for manufacturing 8 musket-barrels, each barrel thus requiring a quart of coal. Oliver Evans, the inventor of the steam engine, certifies in the same pamphlet to his having used it for raising steam, for

which it possessed properties superior to those of any other fuel. Judge Fell of Wilkes-barre applied it to warming houses in 1808, and contrived suitable grates for this use of it; but the cheapness of wood and the greater convenience of a fuel which every one understood how to use, long prevented its general adoption. In the first volume of the "Memoirs of the Historical Society of Pennsylvania," T. C. James, M.D., gives "a brief account of the discovery of anthracite coal on the Lehigh," in which he describes a visit he made to the Mauch Chunk mountain in 1804, where he saw the immense body of anthracite, into which several small pits had then been sunk, and which was afterward worked, as it is still, as an open quarry. He states that he commenced to burn the coal that year, and had continued to use it to the time of making this communication in 1826. The discovery of this famous mass of coal was made in 1791, and in 1793 the "Lehigh Coal Mine Company" was formed to work it. But as there were no facilities for transporting the coal down the valley of the Lehigh, nothing was done until 1814, when, at great labor and expense, 20 tons were got down the river and were delivered in Philadelphia. Two years before this a few wagon loads had been received there from the Schuylkill mines; but the regular trade can hardly be said to have commenced until 1820, when the receipts in Philadelphia amounted to 365 tons. Such was the commencement of the great anthracite trade of Pennsylvania, which in the course of 45 years has been steadily increasing, till it now reaches the enormous amount of 15,368,437 tons for the year 1867, and sustains numerous branches of metallurgical and mechanical industry, the possible dependence of which upon this fuel and source of power was hardly dreamed of when its mines were first opened.

The existence of bituminous coal west of the Alleghanies was probably known as early as was that of anthracite in the eastern part of Pennsylvania; and on the western rivers it could not fail to have been noticed by the early missionaries, voyageurs, and hunters. In the old maps of 1770 and 1777 the occurrence of coal is noted at several points on the Ohio. A tract of coal land was taken up in 1785 near the present town of Clearfield, on the head-waters of the west branch of the Susquehanna, by Mr. S. Boyd, and in 1804 he sent an ark load of the coal down

the Susquehanna to Columbia, Lancaster county, which, he states, caused much surprise to the inhabitants, that "an article with which they were wholly unacquainted should be thus brought to their own doors." This was the commencement of a trade which has since been prosecuted to some extent by running rafts of timber loaded with coal, and sometimes with pig iron also, from the head-waters to the lower portion of the Susquehanna. The bituminous coal mines on the James River, 12 miles above Richmond, in Virginia, were also worked during the last century, but at how early a period we are ignorant. In an account of them in the first volume of the "American Journal of Science," published in 1818, they are spoken of as already having been worked 30 years.

VARIETIES OF COAL.

The mineral coals are found of various sorts, which are distinguished by peculiarities of appearance, composition, and properties. Derived from vegetable matters, they exhibit in their varieties the successive changes which these have undergone from the condition of peaty beds or deposits of ligneous materials—first into the variety known as brown coal or lignite, in which the bituminous property appears, while the fibre and structure of the original woody masses is fully retained; next in beds of bituminous coal comprised between strata of shales, fire-clay, and sandstones; and thence through several gradations of diminishing proportions of bitumen to the hard stony anthracite, the composition of which is nearly pure carbon; and last of all in this series of steps attending the conversion of wood into rock, the vegetable carbon is locked up in the mineral graphite or plumbago. These steps are clearly traceable in nature, and in all of them the strata which include the carbonaceous beds have undergone corresponding changes. The clayey substratum that supports the peat appears under the beds of mineral coal in the stony material called fire-clay (used when ground to make fire-brick); the muddy sediments such as are found over some of the great modern peat deposits, appear in the form of black shales or slates, which when pulverized return to their muddy consistency; the beds of sand, such as are met with in some of the peat districts of Europe interstratified with different peat beds, are seen in the coal-measures in beds of sandstones; and the limestones which also

occur in the same group of strata, represent ancient beds of calcareous marls. The slow progression of these changes is indicated by the different ages of the geological formations in which the several varieties occur. Beds of peat are of recent formation, though some of them are still so old, that they are found at different depths, one below another, separated by intervening layers of sand, clay, and earth. Brown coal, or lignite, is commonly included among the strata of the tertiary period; the bituminous coals are in the secondary formations; and the anthracites, though contained in the same geological group with the great bituminous coal formation, are in localities where the strata have all been subjected to the action of powerful agents which have more or less metamorphosed them and expelled the volatile bitumen from the coal. The graphite or plumbago is in still older groups, or in those which have been still more metamorphosed by heat.

All these varieties of fossil fuel are found in the United States. Peat beds of small extent are common in the northern portion of the country, and in some parts of New England are much used for fuel, and the muck, or decomposed peat, as a fertilizer to the soil. In the great swamps of southern Virginia, the Carolinas, and Georgia, vegetable deposits of similar nature are found upon a scale more commensurate with the extent of the ancient coal-beds. Lignite is not found in workable beds, as in some parts of Germany and England, but in scattered deposits of small extent among the tertiary clays, chiefly near the coast of New Jersey, Delaware, and Maryland, and in the western territories. The distribution of the true coal formations will be pointed out after designating more particularly the characters of the different coals. All of these consist of the elements carbon, hydrogen, oxygen, and nitrogen; the carbon being in part free, and in part combined with the other elements to form the volatile compounds that exist to some extent in all coals. Earthy matters which form the ash of coals are always intermixed in some proportion with the combustible ingredients, and water, also, is present. When coals are analyzed for the purpose of indicating their heating quality by their composition, it is enough to determine the proportions of fixed carbon, of volatile matter, and of ash which they contain. How the combined carbon, hydrogen,

oxygen, and the little nitrogen in their composition, may be distributed in the forms of carburetted hydrogen, ammonia, the bituminous oils, etc., cannot be ascertained by analysis, as the means employed to separate most of these compounds cause their elements to form other combinations among themselves: the determination of the ultimate proportions of all the elements would serve no practical purpose. So, if it be required to prove the fitness of any coal for affording illuminating gas, or the coal oils, it must be submitted to experiments having such objects only in view; and even their capacity for generating heat is better determined by comparative experiments in evaporating water, than by any other mode. The bituminous coals are characterized by their large proportion of volatile matter, which, when they are heated, is expelled in various inflammable compounds, that take fire and burn, accompanied by a dense, black smoke and a peculiar odor known as bituminous. If the operation is conducted without access of air, as in a closed platinum crucible, the fixed carbon remains behind in the form of coke; and by removing the cover to admit air, this may next be consumed, and the residuum of ash be obtained. By several weighings the proportions are indicated. Coals containing 18 per cent. or more of volatile matter are classed among the bituminous varieties; but as the proportion of this may amount to 70 per cent. or more, there is necessarily a considerable difference in the characters of these coals, though their most marked peculiarities are not always owing to the different amounts of volatile matter they contain. Thus, some sorts, called the "fat bituminous," and "caking coals," that melt and run together in burning, and are especially suitable for making coke, contain about the same proportion of volatile matter with the "dry coals," as some of the cannel and other varieties, which burn without melting, and do not make good coke. Other varieties are especially distinguished for their large proportion of volatile ingredients; such are the best cannels, and those light coals which have sometimes been mistaken for asphaltum, as the Albert coal of the province of New Brunswick. These varieties are eminently qualified for producing gas or the coal oils; but have little fixed carbon, and consequently can produce little coke. Coals that contain from 11 to 18 per cent. volatile matter, are known as semi-bi-

tuminous, and partake both of the qualities of the true bituminous coals, in igniting and burning freely, and of the anthracite in the condensed and long-continued heat they produce. The Maryland coals, and the Lykens valley coal of Pennsylvania, are of this character. The true anthracites contain from 2 to 6 per cent. of gaseous matters, which by heat are evolved in carburated hydrogen and water, even when the coal has been first freed from the water mechanically held. Their greatest proportion of solid carbon is about 95 per cent. There remains a class which has been designated as semi-anthracite, containing from 6 to 11 per cent. of combustible volatile matter. These coals burn with a yellowish flame, until the gas derived from the combination of its elements is consumed.

The earthy ingredients in coals, forming their ash, are derived from the original wood and from foreign substances introduced among the collections of ligneous matters that make up the coal-beds. The ash is unimportant, excepting as the material which produces it takes the place of so much combustible matter. In some coals, especially those of the Schuylkill region, it is red, from the presence of oxide of iron, and in

others it is gray, as in the Lehigh coals. This distinction is used to designate some of the varieties of anthracite; but the quality of these coals is more dependent on the quantity of the ash, than on its color. From numerous analyses of the Schuylkill red ash coals an average of 7.29 per cent. of ash was obtained, and of the white ash anthracite, 4.62 per cent. Coals producing red ash are more likely to clinker in burning than those containing an equal amount of white ash. In some varieties of coal the proportion of earthy matter is so great that the substance approaches the character of the bituminous shales, and may be called indifferently either shale or coal. Though such materials make but poor fuel, some of them have proved very valuable from the large amount of gas and of oily matters they afford. The most remarkable of this class is that known as the Boghead cannel. This is largely mined near Glasgow, in Scotland, and is imported into New York to be used in the manufacture of coal oil. It is a dull black, stony-looking substance, having little resemblance to the ordinary kinds of coal. Its composition is given for comparison with that of other coals, in the following table:—

	Localities.	Authority.	Specific Gravity.	Carbon.	Water and other Vol. Mat.	Ashea.
SEMI-ANTHRACITE.	Shenowith Vein, Penn.	H. D. Rogers	1.50	94.10	1.40	4.50
	Peach Mountain, Penn.; mean of 40 analyses....	W. R. Johnson.....	1.46	86.09	6.96	6.95
	Lackawanna.....	W. R. Johnson.....	1.42	88.98	6.36	4.66
	Beaver Meadow.....	".....	1.56	91.64	6.89	1.47
	Price's Mountain, Montgomery Co., Virginia.....	A. H. Everett	1.37	89.25	2.44	8.80
	Portsmouth, Rhode Island.....	Dr. C. T. Jackson....	1.85	85.54	10.50	8.66
	Mansfield, Mass.	".....	1.69	87.40	6.20	6.40
	Atkinson's and Templeman's, Maryland; average of 2 specimens.....	W. R. Johnson.....	1.813	76.69	15.53	7.83
	George's Creek, Maryland.....	".....	1.35	70.75	16.03	13.22
	Pittsburg, Pennsylvania.....	B. Silliman, jr. ....	.....	64.72	32.95	2.81
BITUMINOUS.	Cannelton, Indiana.....	W. R. Johnson.....	1.272	59.47	36.59	8.94
	Black Heath, James River, Virginia.....	".....	.....	58.79	32.57	9.64
	Monroe Co., S. Illinois.....	J. G. Norwood.....	1.246	58.70	36.20	4.50
	La Salle Co., N. Illinois.....	".....	1.237	55.10	39.90	3.00
	Albert Coal, New Brunswick.....	B. Silliman, jr.	1.129	36.04	61.74	2.22
	Grayson (Ky.) cannel.....	".....	1.371	14.38	62.63	23.62
	Breckinridge (Ky.) cannel.....	".....	1.150	27.16	64.30	8.43
	Boghead, black cannel.....	Dr. Penny.....	1.218	9.25	62.70	26.50
	Boghead, brown.....	".....	1.160	7.10	71.06	26.20

A complete description of the coals, such as may be found in the Report of Prof. Walter R. Johnson (Senate Document, 28th Congress, No. 386), and presented, in a condensed form, in Johnson's Edition of "Knapp's Chemical Technology," presents many other features affecting the qualities of the coals, and their adaptation to special uses. Such are—1, their capacity for raising

steam quickly; 2, for raising it abundantly for the quantity used; 3, freedom from dense smoke in their combustion; 4, freedom from tendency to crumble in handling; 5, capacity, by reason of their density, and the shapes assumed by their fragments, of close stowage; and 6, freedom from sulphur. The last is an important consideration, affecting the value of coals proposed for use in the

iron manufacture, sulphur, which is often present in coal in the form of sulphuret of iron, having a very injurious effect upon the iron with which it is brought in contact when heated. It is again to be cautiously guarded against in selecting bituminous coals to be employed in steam navigation; for by the heat generated by spontaneous decomposition of the iron pyrites, the easily ignited bituminous coals may be readily set on fire. This phenomenon is of frequent occurrence in the waste heaps about coal mines, and large bodies of coal stored in

yards and on board ships have been thus inflamed, involving the most disastrous consequences. In stowage capacity coals differ greatly, and this should be attended to in selecting them for use in long voyages. Tendency to crumble involves waste. Dense smoke in consuming is objectionable in coals required for vessels-of-war in actual service, as it must expose their position when it may be important to conceal it. The following table was prepared by Prof. Johnson to present some of the general results in these particulars of his experiments:—

GENERAL SCALE OF RELATIVE VALUES FORMED FROM THE AVERAGES OF EACH CLASS OF COAL
SUBJECTED TO TRIAL.

	1.	2.	3.	4.	5.
Maryland free-burning coals.....	1000	1000	395	880	682
Pennsylvania anthracite.....	977	986	1000	893	319
Pennsylvania bituminous.....	951	938	390	1000	914
Virginia (James River) bituminous.....	850	757	242	948	730
Foreign bituminous.....	801	741	331	948	1000

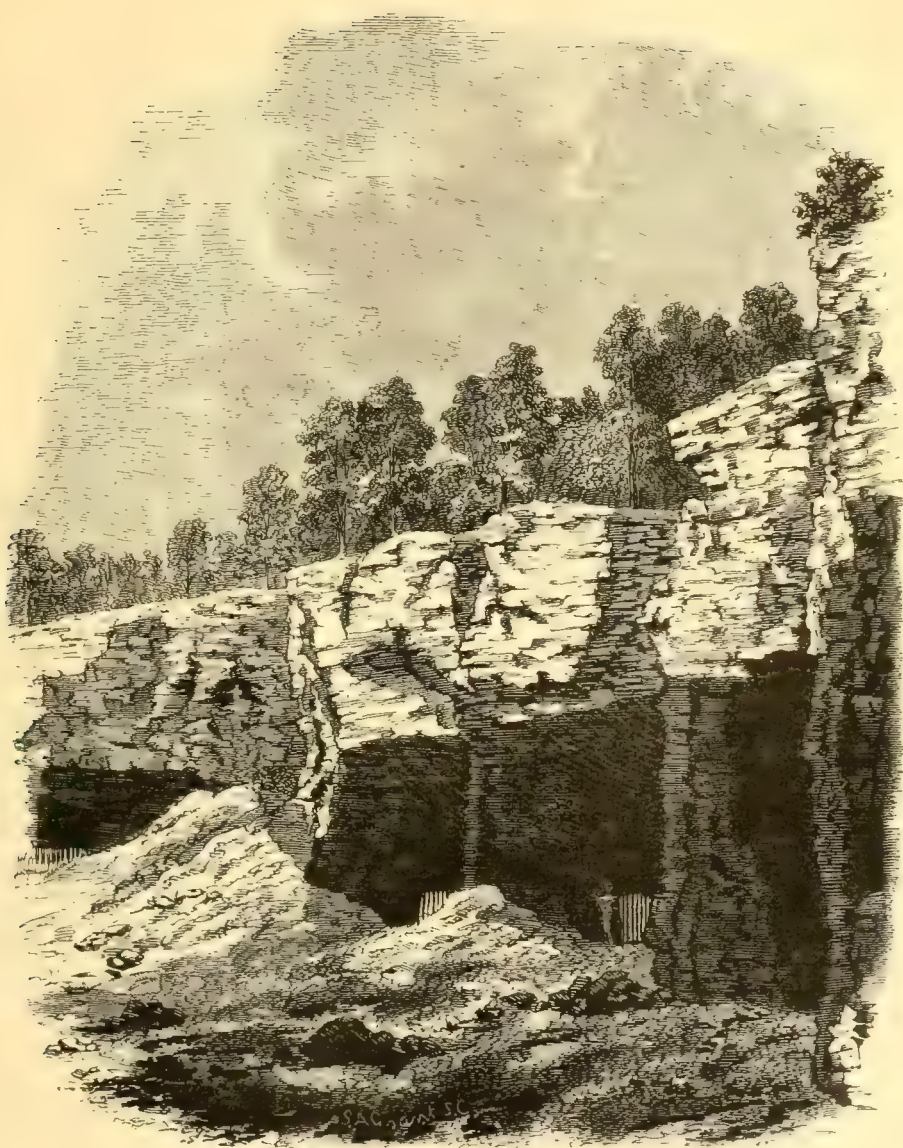
Column 1 gives the relative evaporative powers of equal weights of the coals; 2, the same of equal bulks; 3, their relative freedom from tendency to clinker; 4, rapidity of action in evaporating water; 5, facility of ignition, or readiness with which steam is gotten up. The general results of experience in use, as well as of special trials systematically conducted upon a large scale, agree in these particulars—that while the bituminous coals are valuable for the greater variety of uses to which they are applicable, and especially for all purposes requiring flame and a diffusive heat, as under large boilers; and while they are quickly brought into a state of combustion, rendering the heat they produce more readily available; the anthracites afford a more condensed and lasting heat, and are to be preferred in many metallurgical operations, especially where great intensity of temperature is required. And for many purposes, the free-burning, semi-bituminous coals, which combine the useful properties of both varieties, are found most economical in use.

GEOLOGICAL AND GEOGRAPHICAL DISTRIBUTION.

The United States is supplied with coal from a number of coal-fields belonging to what are called the true coal-measures, or the carboniferous group, a series of strata sometimes amounting, in aggregate thickness, to 2000 and even 3000 feet, and whether found in this country or in Europe, readily recognized by the resemblance in

the various members of its formation, its fossil organic remains, its mineral accompaniments, and by its position relative to the other groups of rock which overlie and underlie it. The principal one of these fields or basins is that known as the Appalachian, which, commencing in the north-eastern part of Pennsylvania, stretches over nearly all the state west of the main Alleghany ridge, and takes in the eastern portion of Ohio, parts of Maryland, Virginia, Kentucky, Tennessee, the north-west corner of Georgia, and extends into Alabama as far as Tuscaloosa. Its total area, including a number of neighboring basins, as those of the anthracite region to the east of the Alleghany ridge, which were originally a part of the same great field, is estimated at about 70,000 square miles. A second great basin is that which includes the larger part of Illinois, and the western portion of Indiana and of Kentucky. Its area is estimated at about 50,000 square miles; the coal is bituminous, and largely charged with oil.

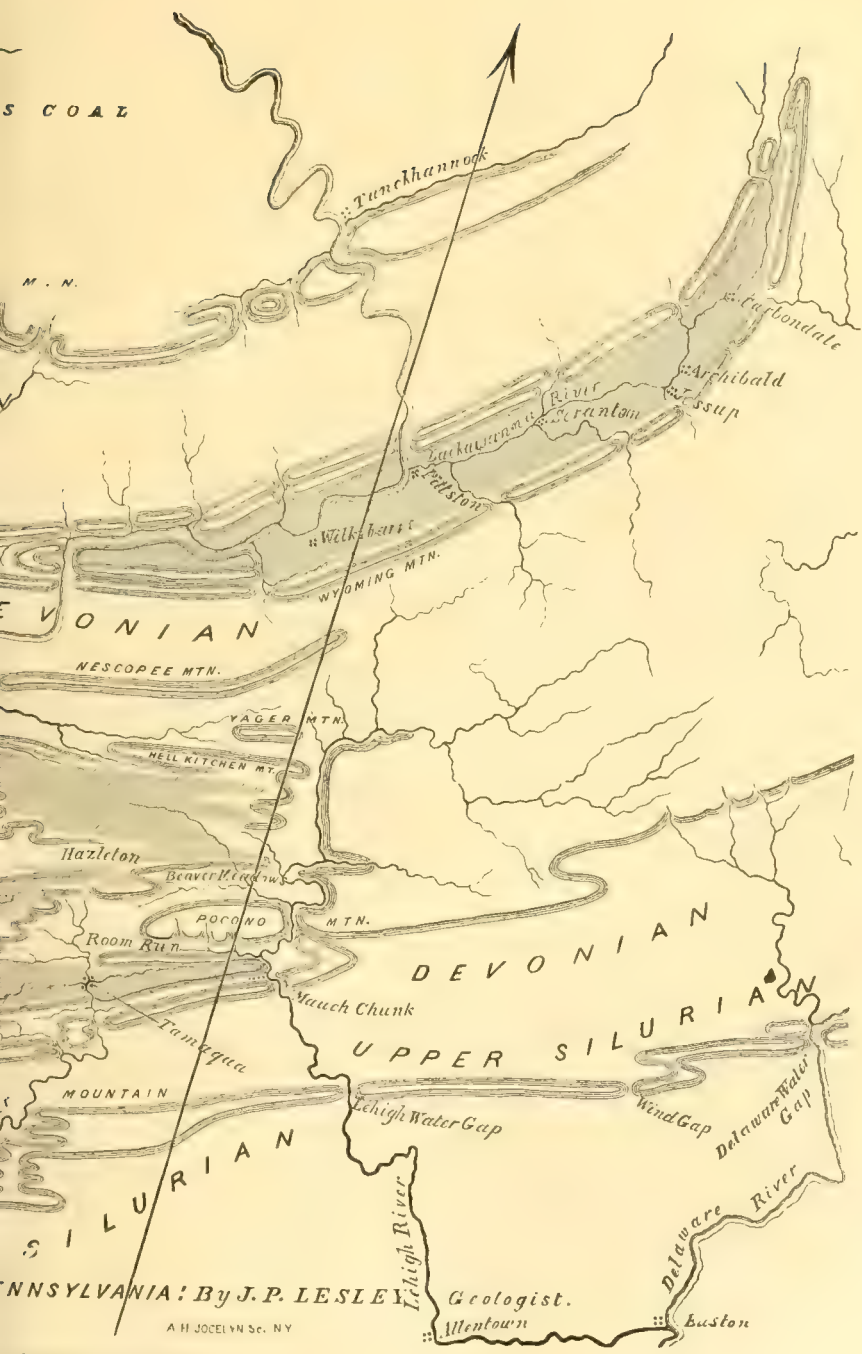
The third coal field, now known as the Rocky Mountain Coal Field, is the largest in the world, embracing an area in North America of 1,250,000 square miles of which 513,000 square miles is within the United States. It covers large areas in Texas, the Indian Territory, New Mexico, Kansas, Nebraska, Iowa, Dakota, Montana, Wyoming, and Colorado. The coal is semi-bituminous and of good quality. The coal of the Pacific States is mainly lignite, containing about 50 per cent. of carbon, but on Vancouver's



BALTIMORE COMPANY'S MINE, WILKESBARRE, PA.

S COAL

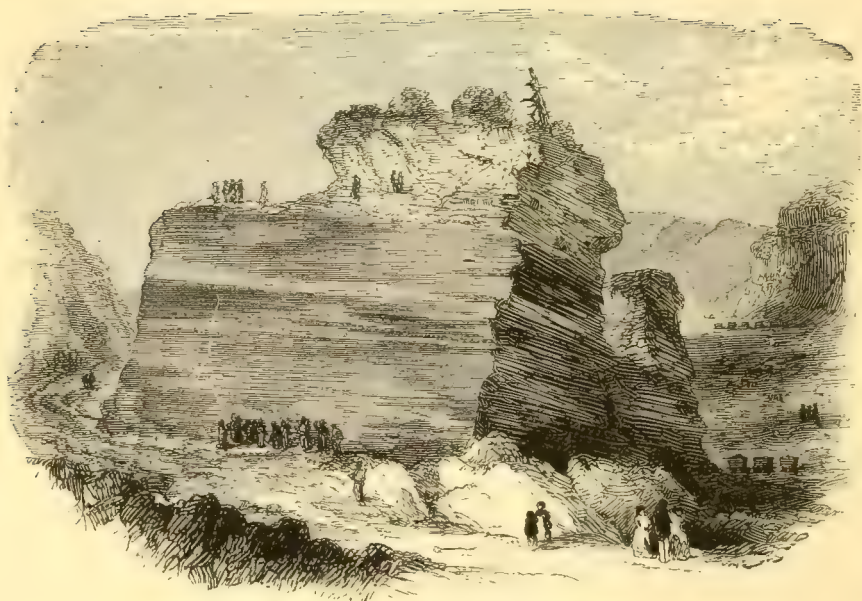
M. N.



PAENNSYLVANIA: By J. P. LESLEY, Geologist.

A. H. JOCELYN Sc. N. Y.

Am. American Cyclopaedia.



THE GREAT OPEN QUARRY OF THE LEMIGIL.

In working this great quarry of anthracite at the Summit mine, above Mauch Chunk, blocks of coal were occasionally left standing for a time, one of which, surmounted by the soil of the original surface and the relics of the vegetation, is represented in the above cut. In this block are discerned the lines of stratification of the coal; and an idea of its extraordinary thickness and extent is conveyed by the appearance of the cliffs upon the further side of the excavated area. Upon the floor of the quarry are seen the mining wagons used for conveying away upon temporary tracks the coal and rubbish of the excavations.

whole area of this field has been computed at 57,000 square miles; but its limits have never been accurately defined. A fourth coal-field occupies the central portion of the southern peninsula of Michigan, its area being about 13,350 square miles. Several small beds of bituminous coal are worked in this district, but they have only local importance. A fifth coal-field is that of Rhode Island and south-eastern Massachusetts. The strata of this district are considered as belonging to the true coal-measures, although, from the metamorphic action to which they have been subjected, their true character is very obscure. They contain a few beds of anthracite, very irregular in their dimensions, and much crushed. A number of mines have been opened, but the only one now worked is at Portsmouth, 8 miles north of Newport. In south-eastern Virginia is a bituminous coal-field, lying on both sides of the James River, a few miles above Richmond. The strata which contain the coal-beds of this district are recognized as members of later formation than those of the true coal-measures, being classed with the geological group known as the oolite, or lias; and the coal-beds of central North Carolina, on Deep River, probably belong to the same position in the geological column. Notwithstanding the limited area of this coal-field in Virginia, which is only about 25 miles long and 8 to 10 miles wide, it has produced for more than sixty years past large quantities of coal chiefly for the supply of iron manufacturing establishments, and the gas-works along the seaboard to the north. The strata of these coal-measures occupy a deep depression in the granitic rocks of this region, attaining in the centre of the basin a thickness of nearly 2000 feet. They consist in great part of a micaceous sandstone, and the two or three coal-beds are contained in the lower 150 feet. A great bed at the bottom, which in some places exceeds 40 feet in thickness, and in others dwindles away to 4 or 5 feet only, appears to have been deposited upon the uneven granitic floor, from which it is separated by only a few inches of slate. Shafts have been sunk near the east border of the coal-field to the depth of nearly 900 feet. The amount of coal obtained of late years does not probably exceed 130,000 tons per annum. A singular phenomenon is observed at one point in this district, where a coal-bed is penetrated and overlaid by a body of trap-

rock. The coal near this rock is converted into a mass of coke, resembling that artificially produced, except that it is more compact and of a duller lustre.

A large amount of bituminous coal has been brought to Boston and New York, for many years past, from a coal-field belonging to the true coal-measures, in Nova Scotia and Cape Breton. The same formation extends into New Brunswick, and ranges along the western part of Newfoundland, and has been estimated as comprising in all an area of 9000 square miles. The productive portions, however, are limited to a few localities upon the coast of Nova Scotia and Cape Breton, and at these, beds of great thickness have been opened, and worked to the depth of from 200 to 450 feet. At the Pictou mines, opposite the southern point of Prince Edward's Island, one bed is 29 feet thick. Another bed, at the Albion mines, 8½ miles from Pictou, affords 24 feet of good coal, and 12 more of inferior quality; and in Sydney, Cape Breton, are beds of 11 feet, 9 feet, and 6 feet, besides at least 11 others of less thickness. At the South Joggins cliffs, in Nova Scotia, the total thickness of all the strata of the coal-measures was found by Mr. Logan to amount to 14,571 feet, very much exceeding the thickness of the formation as observed in other places on the American continent.

The strata which make up the coal formation, the principal varieties of which have already been named, are regularly laid one upon another in no particular order, and amount in aggregate thickness to several thousand feet, rarely exceeding in the United States 3000 feet. Their thickness is ascertained by sections measured at different localities, some giving one part of the column, and others other portions. In western Pennsylvania the nearly horizontal beds of rock are often exposed in the sides of the precipitous hills, so that sections of several hundred feet may be fully made up. Any peculiar member of the pile, as a bed of limestone, occurring near the top of the section, may be recognized in other localities, where by the dip of the strata it is brought to the lower levels, and the hills above it then present the succession of the higher members of the column; or if the layer taken as the starting point be in the one case at the base, it will be found in the direction of the rising of the strata, at higher and higher elevations, and the lower mem-

200

110 Gray and buff micaceous slaty sandstone.

5 Dark calcareous slate.
6 Limestone.

56 Blue, buff, and olive shales.

18 Dark gray massive sandstone.

44 Sandstones and shales.

Limestone, thin.

69 Variegated shales and sandstone.

0.4 Limestone.
3 Limestone.
15 Shale & sandstone.
2 Limestone.

18 Dark gray shale.
1 Coal.
12 Shale & limestone.
15 to 25 Thin bedded Limestone. [sandstn.]

42 Blue shale and sandstone.

0.10 Coal.
Blue and buff shale.
13 Flaggy sandstones.

15 Yellow shale.

14 Slaty sandstone.

17 to 20 Buff shales.

11 to 14 Gray micaceous sandstone.

50 Buff shales.

3.6 Limestone.

20 Buff shales.

0.9 Coal.

20 Sandstone.

4 Shale.

1 Coal.

56 Shales, sandstones & limestone.

2 Coal.

4 Blue friable shale.

35 Gray or brown sandstones.

6 Wayneburg coal.
5 Soft shale.

35 Gray sandstone.

8 Limestone.

10 Shale.

20 Flaggy sandstone.

10 Shale.

18 Limestone.

5 Black slate.

18 Slaty sandstone.

8 Black calcareous slate.

16 Limestone.

20 Shale.

25 Gray slaty sandstone.

35 Brown shale.

14 Pittsburg coal.

60 Shales, calcareous and arenaceous.

3 Limestone.

50 to 70 Calcareous and shaly beds, slaty sandstone, &c.

Green and olive shale.

150 to 200 Greenish slate & sandstone.

30 Green, purple, and brown shale.

1 to 5 Limestone.

40 to 60 Sandstone & green shale.

70 to 130 Slates, shales, and sandstones.

3.6 Up'r Freeport coal.
4 to 7 Limestone.

30 to 40 Slate and slaty sandstone.

3 Lower Freeport coal often channel.

50 to 60 Massive sandstone.

75 Slate, shale, or sandstone.

3 to 4 Kittanning coal

30 Slate, shale, or sandstone.

0.4 to 6 Iron ore.

15 Ferriferous limestone.

30 Slate and shale.

3 to 4 Clarion coal

25 Slate and shale.

1 to 2 Brookville coal.

5 to 15 Shale.

50 to 60 Massive sandstone.

2 to 25 Brown & black shale.

1 to 4

15 Shale and sandstone.

15 Shale and sandstone.

15 Shale and sandstone.

15 Shale and sandstone.

15 Shale and sandstone.

100 Sandstone and conglomerate.

20 Slaty sandstone.

1 to 4 Sharon coal.

25 Dark shale.

15 Shale.

15 Brown shale.

Sandstone.

Mercer or Tionesta coal.

Coal 1.3

Coal 1

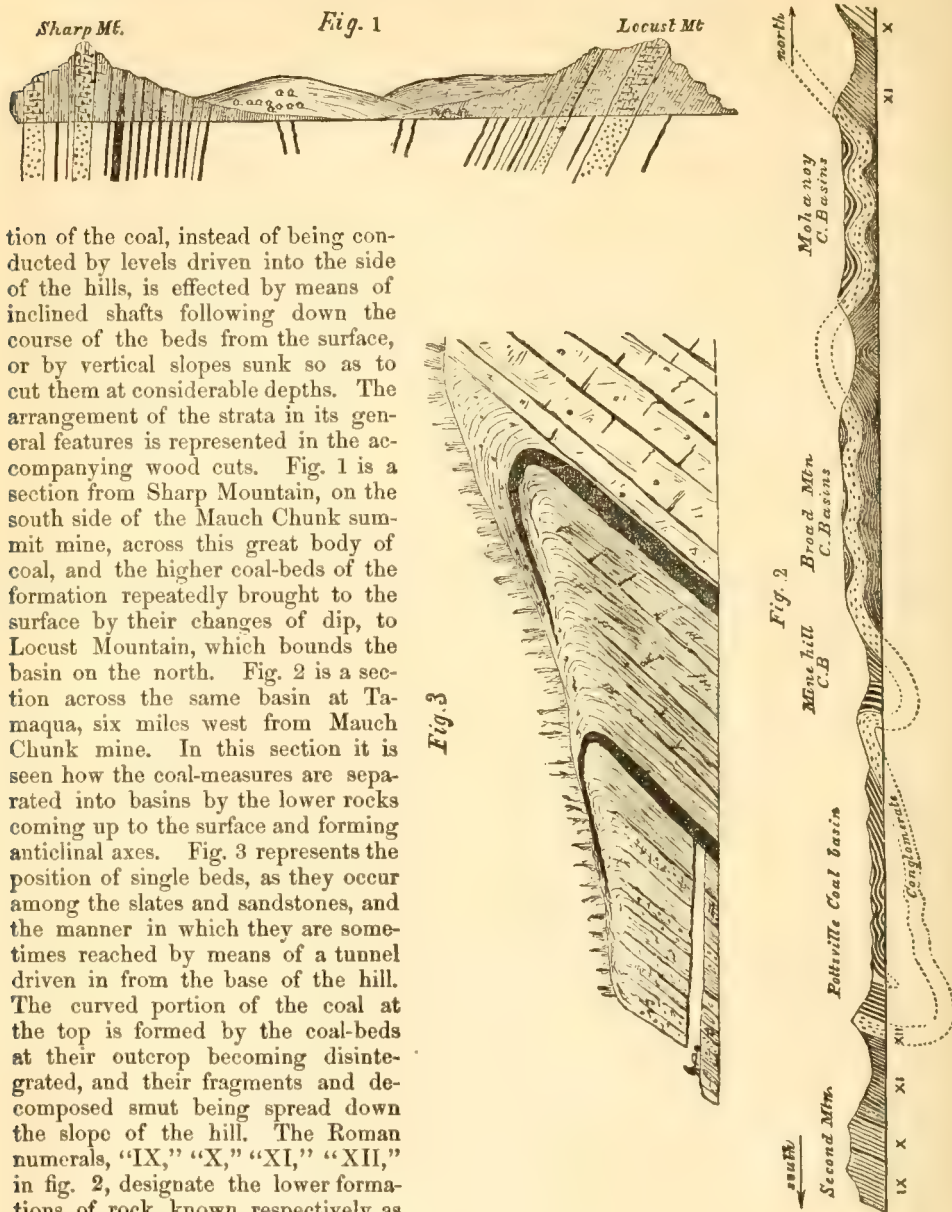
Coal 1.3

bers of the column will then be brought into view at the base of the hills. Thus, at Pittsburg, the hills opposite the city afford a section of 300 or 400 feet, and the marked stratum is here the great coal-bed, which up the Alleghany river toward the north rises to higher and higher levels in the hills, and toward the south, up the Monongahela, sinks to lower levels, till it passes beneath the bed of the stream. By extending these observations over the coal-field, it is found that the whole series of strata maintain their general arrangement, and the principal members of the group, such as an important coal-bed, a peculiar bed of limestone, etc., may be identified over areas of thousands of square miles. It is thus the sections have been prepared at many localities to complete the series, as presented on the opposite page, of the bituminous coal-measures of the extreme western part of Pennsylvania. The coal-beds introduced are those which are persistent over the greatest areas. Others occasionally appear in different parts of the column, and various other local differences may be detected, owing to the irregularities in the stratification; thus sandstones and slates often thin out, and even gradually pass from one into the other. By their thinning out beds of coal separated by them in one locality may come together in another, and form one large bed; and again, large coal-beds may be split by hardly perceptible divisional seams of slate or shale, which may gradually increase, till they become thick strata, separating what was one coal-bed into two or more. The limestones, though generally thin, maintain their peculiar characters much better than the great beds of sandstone or shale, and are consequently the best guides for designating in the columns the position of the strata which accompany them, above and below. The fire clay is almost universally the underlying stratum of the coal-beds. In the sections it is not distinguished from the shale-beds. The total thickness of all the measures, is from 2000 to 2500 feet.

Such is the general system of the coal-bearing formation west of the Alleghanies. Every farm and every hill in the coal-field is likely to contain one or more beds of coal, of limestone, of good sandstone for building purposes, of fire clay, and some iron ore; and below the surface, the series is continued down to the group of conglomerates and sandstones, which come up

around the margins of the coal-fields and define their limits. At Pittsburg this group, it is found by boring, as well as by the measurements of the strata in the hills toward the north, is about 600 feet below the level of the river. The coal-measures in this portion of the country are the highest rock formation; but in the western territories beyond the Mississippi they pass under later geological groups, as the cretaceous and the tertiary. All the coals are bituminous, and the strata in which they are found are little moved from the horizontal position in which they were originally deposited. They have been uplifted with the continent itself, and have not been subjected to any local disturbances, such as in other regions have disarranged and metamorphosed the strata.

East of the Alleghanies, in the narrow, elongated coal-fields of the anthracite region, a marked difference is perceived in the position assumed by the strata, and also in the character of the individual beds. They evidently belong to the same geological series as the bituminous coal-measures, and the same succession of conglomerates, sandstones, and red shales, is recognized below them; but the strata have been tilted at various angles from their original horizontal position, and the formation is broken up and distributed in a number of basins, or canal-shaped troughs, separated from each other by the lower rocks, which, rising to the surface, form long narrow ridges outside of and around each coal-field. Those on each side being composed of the same rocks, similarly arranged, and all having been subjected to similar denuding action, a striking resemblance is observed, even on the map, in their outlines; and in the ridges themselves this is so remarkable that their shapes alone correctly suggest at once to those familiar with the geology of the country, the rocks of which they are composed. Upon the accompanying map, from the first vol. of the "New American Cyclopædia," these basins are represented by the shaded portions, and the long, narrow ridges which surround the basins, and meet in a sharp curve at their ends, are indicated by the groups of four parallel lines. Within the marginal hills the strata of the coal-measures, and of the underlying formations, while retaining their arrangement in parallel sheets, are raised upon their edges and thrown into undulating lines and sharp flexures; and the extrac-



tion of the coal, instead of being conducted by levels driven into the side of the hills, is effected by means of inclined shafts following down the course of the beds from the surface, or by vertical slopes sunk so as to cut them at considerable depths. The arrangement of the strata in its general features is represented in the accompanying wood cuts. Fig. 1 is a section from Sharp Mountain, on the south side of the Mauch Chunk summit mine, across this great body of coal, and the higher coal-beds of the formation repeatedly brought to the surface by their changes of dip, to Locust Mountain, which bounds the basin on the north. Fig. 2 is a section across the same basin at Tamaqua, six miles west from Mauch Chunk mine. In this section it is seen how the coal-measures are separated into basins by the lower rocks coming up to the surface and forming anticlinal axes. Fig. 3 represents the position of single beds, as they occur among the slates and sandstones, and the manner in which they are sometimes reached by means of a tunnel driven in from the base of the hill. The curved portion of the coal at the top is formed by the coal-beds at their outcrop becoming disintegrated, and their fragments and decomposed smut being spread down the slope of the hill. The Roman numerals, "IX," "X," "XI," "XII," in fig. 2, designate the lower formations of rock, known respectively as the red sandstones (corresponding to the "Old Red Sandstone"); a series of gray sandstones; one of red shales; and lastly, the conglomerate. The dotted lines above and below the section mark the continuity of the conglomerate beneath the base of the section and its original course above the present surface before this portion had been removed by diluvial action. The other

formations obviously accompany the conglomerate with similar flexures.

The same cause, that threw the strata into their inclined and contorted positions, no doubt changed the character of the coal by dispelling its volatile portions, converting it in fact into coke, while the pressure of the superincumbent beds of rock pre-

vented the swelling up of the material, as occurs in the ordinary process of producing coke from bituminous coal, and caused it to assume the dense and compact structure of anthracite. As the anthracite basins are traced westward, it is observed that the coals in those districts which have been less disturbed, retain somewhat of the bituminous character; and if the continuity were uninterrupted between the anthracite and the bituminous coal-fields, there is no doubt that a gradual passage would be observed from the one kind of coal to the other, and that this would be accompanied by an amount of disturbance in the strata corresponding to the degree in which the coal is deficient in bitumen.

AMOUNT OF AVAILABLE COAL.

In estimating the quantities of workable coal in any district, several points are to be taken into consideration besides the amount of surface covered by the coal-measures and the aggregate thickness of all the beds they contain. Out of the total number of coal-beds, there are more or less of them that must be excluded from the estimate, on account of their being too thin to work. The great depth at which the lower beds in the central parts of the Appalachian coal-field lie must probably prevent their ever being worked; but for this no allowance is ever made in the estimates of quantities of coal.

The most careful and complete computations of this nature which have been made are those of Professor H. D. Rogers, and of Mr. Bannan in the Coal Statistical Register for 1871. From these sources we obtain the following estimates:

EXTENT OF COAL-FIELD IN THE SEVERAL STATES POSSESSING THE COAL FORMATION.

	Sq. miles.
Massachusetts and Rhode Island.....	100
Pennsylvania.....	12,656
Ohio.....	7,100
Maryland.....	550

RELATIVE AMOUNT OF COAL IN THE SEVERAL

GREAT COAL-FIELDS OF EUROPE AND AMERICA.		Tons.	Ratio.
Belgium (assuming an average thickness of about 60 feet of coal) contains about.....	36,000,000,000	1	
France (with same thickness) contains about.....	59,000,000,000	1.64	
The British Islands (averaging 35 feet thickness) contain nearly.....	190,000,000,000	5.28	
Pennsylvania (averaging 25 feet thickness) contains.....	316,400,000,000	8.8	
The great Appalachian coal-field (including Pennsylvania, averaging 25 feet).....	1,387,500,000,000	38.5	
Coal-field of Indiana, Illinois, and western Kentucky (average thickness 25 ft).....	1,277,500,000,000	35.5	
The Rocky Mountain basin (averaging 30 feet).....	3,739,000,000,000	10.29	
All the productive coal-fields of North America (with an assumed thickness of 20 feet of coal, and a productive area of 200,000 sq. miles).....	6,720,400,000,000	186.	
All the coal-fields of Europe.....		8.75	

The following table contains the yearly returns of the coal product of the United States, from the commencement of the trade in 1820:

Virginia.....	15,900
Kentucky.....	13,700
Tennessee.....	3,700
Alabama.....	6,130
Georgia.....	170
Indiana.....	6,700
Illinois.....	40,000
Michigan.....	13,350
Iowa.....	24,000
Missouri.....	21,329
Nebraska.....	84,000
Kansas.....	80,000
Arkansas.....	12,597
Indian Territory.....	40,000
Texas.....	30,000
New Mexico.....	20,000
Wyoming.....	20,000
Colorado.....	20,000
Montana.....	74,000
Dakota.....	100,000
Total.....	650,862

In the anthracite basins of Pennsylvania the number of workable beds varies from 2 or 3 to 25, according to the depth of the basin; the average number is supposed to be 10 or 12. The maximum thickness of coal is in the Pottsville basin, and amounts to 207 feet. Rejecting the thin seams, the average thickness in the south anthracite field is reckoned at 100 feet; in the middle or north field at about 60 feet; and the general average of the whole, 70 feet.

The maximum thickness of the 15 or 16 coal-beds of the central part of the Appalachian coal-field is about 40 feet, but the average of the whole basin is considered to be 25 feet.

The basin extending over Illinois and into Indiana and Kentucky, contains in the last-named state 16 or 17 workable beds, with a maximum thickness of about 50 feet. The average over the whole area is supposed to be 20 or 25 feet.

The following estimates of the British coal-fields are introduced for comparison. Extending these computations to Belgium and France also, the result of calculations of available coal supply, in 1870, are as follows:

TRANSPORTATION OF COAL TO MARKET.

The first anthracite from the Schuylkill mines was brought to Philadelphia in wagons. The navigation of the river and canal was hardly practicable for boats previous to the year 1822; and though from that year anthracite was conveyed to Philadelphia and the trade continued to increase, it was not until 1825 that a large amount of coal could be transported by this route. The effect of these improvements was experienced in the transportation of 6,500 tons in 1825; in 1826 it increased to 16,763. As for successive years the trade steadily and rapidly increased in importance, the capacity of the canal proved at last insufficient for it, and the Reading railroad was laid out for its accommodation, and constructed with a uniform descending grade from the mining region at Pottsville to the Delaware river. It was opened in 1841, and proved a formidable competitor to the Schuylkill canal, but the increasing trade has surpassed the capacity of both these routes. Other lines have been constructed, till now there are six or seven railroads engaged almost exclusively in the transportation of the anthracite and semi-anthracite coals from the mines.

As seen by the table, the first shipments of anthracite were from the Lehigh region, two years before any were sent from the Schuylkill. The transportation was effected by arks or large boxes built of plank, and run down the rapid and shoal river with no little risk. To return with them was impracticable, nor was this desired, for the arks themselves were constructed of the product of the forests, which in this form was most conveniently got to market. As the coal trade increased in importance, the Lehigh Coal and Navigation Company, to insure greater facility in running the arks, constructed dams across the shoaler places in the river, by which the water was held back, thus increasing the depth above. As the arks coming down the river reached one of these dams, the sluice gates were opened and the boats descended to the next dam below. At first two arks were connected together by hinges at the ends; subsequently more were thus joined together, till they reached nearly 200 feet in length. In 1831 the slack-water navigation of the Lehigh was so far perfected, that it was used by canal boats ascending and descending through regular locks.

Up to the year 1827 the transportation

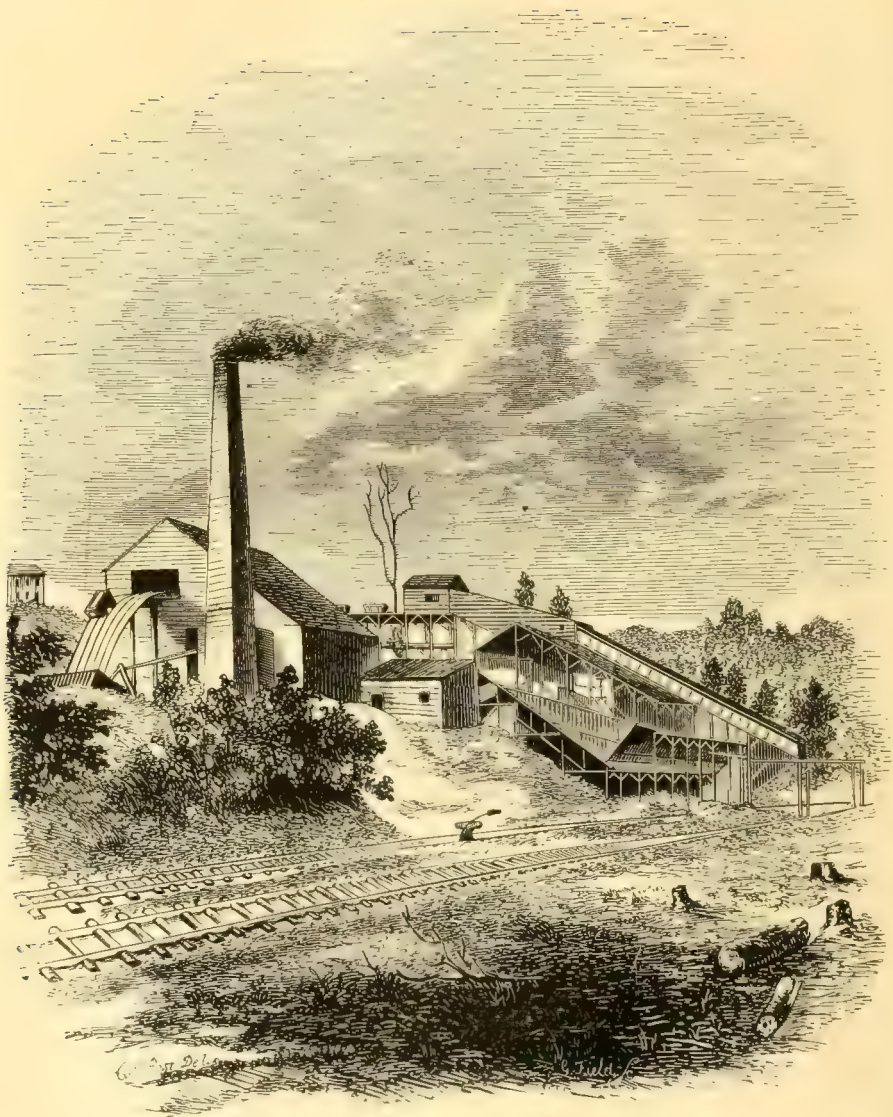
of anthracite to Mauch Chunk, nine miles from the mines, was by wagons. The Mauch Chunk road, completed in May, 1827, was made with a descending grade, averaging about 100 feet to the mile, so that the loaded cars ran down by gravity. Each train carried down with it in cars appropriated to this use the mules for drawing the empty cars back; and it is stated that after the animals once became accustomed to the routine of their duties they could never be made to travel down the road if accidentally left behind. The trade before many years outgrew these increased facilities of transporting the coal, and it was found essential to return the empty cars by some more economical method. On account of the heavy upgrade, locomotives, it was concluded, could not be advantageously employed, and hence a system of inclined planes and gravity roads was devised, by which the cars hoisted by stationary power to the summit of the planes and thence descending the gravity roads might be returned to the mines. In the accompanying sketches a part of this arrangement of roads is exhibited.

The high hill called Mount Pisgah, above the village of Mauch Chunk, is the terminating point at the Lehigh river of the long ridge called Sharp Mountain. The lower road seen in the sketch is called the loaded track. The cars come by this from the mines, and being let down the inclined plane at its terminus, their loads are discharged into the great bins over the edge of the river. They are then hauled a short distance to the foot of the long plane that reaches to the summit of Mount Pisgah, and by the stationary steam engine are drawn up in about six minutes to an elevation 850 feet above that at the foot. The length of this plane is 2250 feet. From its summit the empty cars run down the inclined road constructed along the south side of the ridge, and at the distance of six miles, having descended about 300 feet, they reach the foot of another inclined plane at Mount Jefferson. This plane is 2070 feet long, rising 462 feet. The ascent is accomplished in three minutes, and from the top another gravity road extends about a mile, descending 44 feet to the Summit Hill village. From this point branch roads lead to the different mines in Panther Creek valley, and all meet again in the loaded track road by which the cars return to Mauch Chunk.

The transportation of coal from Mauch Chunk was conducted by the river and canal



MOUNT PISGAH PLANE, MAUCH CHUNK, PA.



COLLIERY SLOPE AND BREAKER AT TUSCARORA, PA.



MOUNT PISGAH PLANES AND THE GRAVITY RAILROAD, MAUCH CHUNK.

exclusively until the partial construction of the Lehigh railroad in 1846. But it was not until its completion in 1855, that this began to be an important outlet of the coal region and a powerful competitor for the trade with the canal.

A considerable amount of anthracite finds a market on the borders of Chesapeake Bay, being transported from the mines near the Susquehanna river by the Susquehanna tide-water canal, and by the Northern Central railroad. Its consumption is extending in this region by its use in the blast furnaces in the place of charcoal, for smelting iron ores, and the receipts of this fuel in the city of Baltimore are about one-sixth of those of the semi-bituminous coals of the Cumberland region, which are brought to the city by the Baltimore and Ohio railroad and the canal. The receipts during the years named below were as follows :

	1857. Tons.	1860. Tons.	1869. Tons.	1870. Tons.
Bituminous.....	443,782	397,684	1,882,619	1,717,075
Anthracite.....	267,334	325,129	270,240	305,494
	701,116	722,813	2,152,909	2,022,571

The principal outlet of the Northern coal-field had been from 1829 to 1850 by the Delaware and Hudson canal. Since 1847 there have been taken every year to the Hudson river by this route from about 440,000 to 499,650 tons, except in 1855, when the quantity was 565,460 tons. A number of railroads now connect this basin with the central railroad across northern New Jersey, and in other directions it is connected both by railroad and canals with the Erie railroad to the North and the Susquehanna river to the South-west. As large an amount of coal is now transported over each one of three of these lines as by the Delaware and Hudson canal.

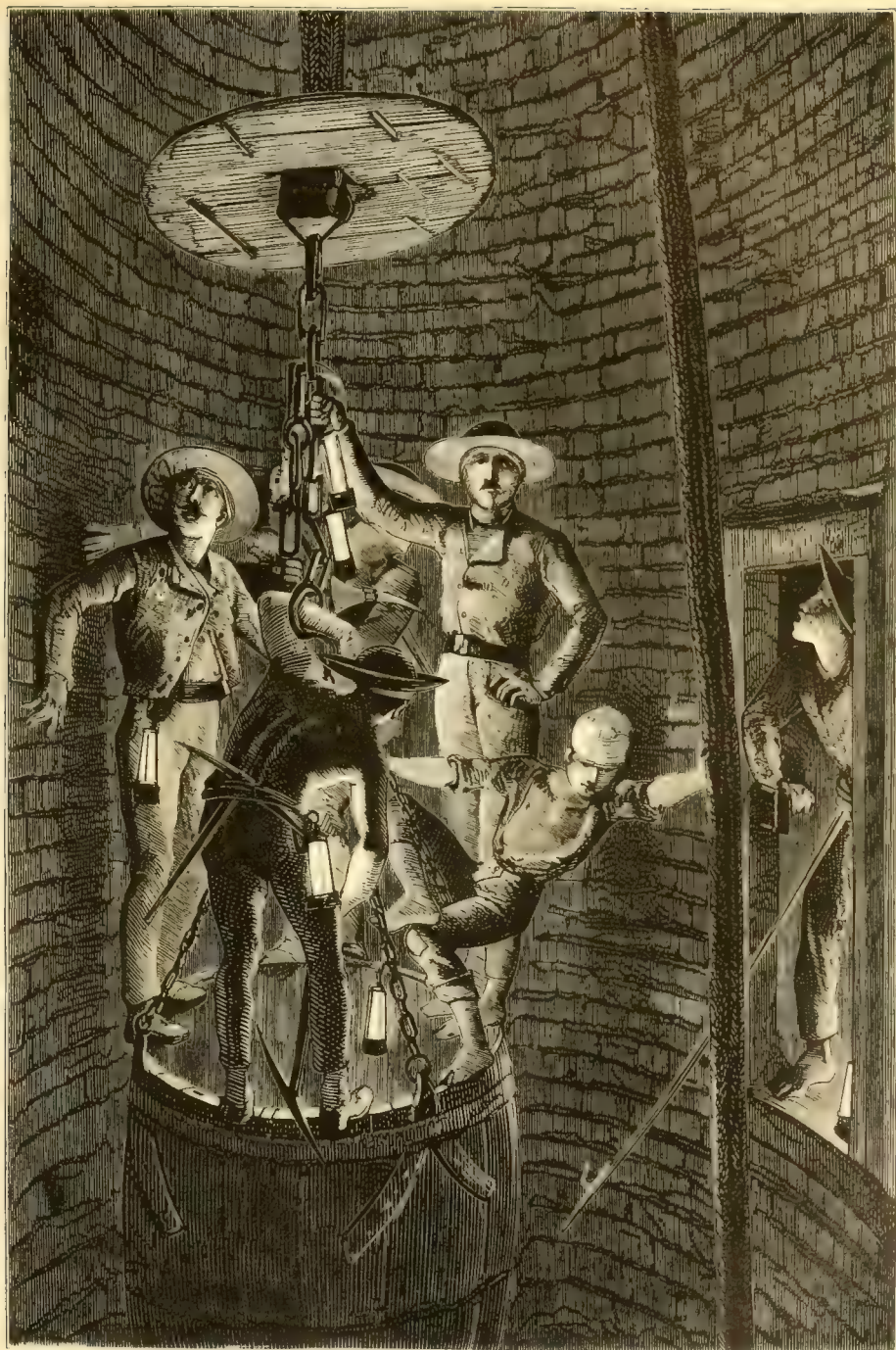
The various railroads and canals which have been constructed with especial reference to the transportation of anthracite, are more than 48 in number, and have cost over \$260,000,000. Most of them are presented in the following table; of some of them only those portions which may fairly be counted as constructed for coal purposes :—

Names of railroads and canals.	Canals. No. miles.	Railroads. No. miles.	Total cost.
Lehigh Navigation.....	87	..	\$4,455,000
Lehigh and Susquehanna railroad and branches.....	..	193	13,570,595
Muncie and Summit railroads.....	..	36	831,684
Delaware division of the Pennsylvania canal.....	43	..	1,734,958
Beaver Meadow railroad and branch.....	..	38	360,000
Hazleton railroad.....	..	20	253,000
Philadelphia and Erie railroad.....	..	288	20,000,000
Summit railroad.....	..	2	60,000
Lehigh Valley railroad and branches.....	..	238	20,000,000
Delaware and Hudson canal.....	103	..	3,250,000
Morris canal.....	102	..	4,000,000
The Schuylkill Navigation.....	108	..	5,785,000
Reading railroad and branches.....	..	153	29,822,729
Shamokin and Pottsville Valley railroad and branch.....	..	34	1,569,450
Little Schuylkill railroad.....	..	32	1,466,187
Duville and Pottsville railroad (44½ miles unfinished).....	..	34	1,895,000
Mine Hill and Schuylkill Haven railroad and branches.....	..	143	3,775,000
Mount Carbon railroad and branches.....	..	13	203,260
Port Carbon railroad and branches.....	..	14	282,350
Schuylkill Valley railroad and branches.....	..	30	576,050
Mill Creek railroad and branches.....	..	32	323,375
Lykens Valley railroad.....	..	215	975,868
Wiconisco canal.....	12	..	370,000
Swatara railroad.....	..	6	41,780
North Branch canal.....	163	..	3,790,310
Union canal and Pine Grove branch.....	90	..	1,000,000
Schuylkill and Susquehanna railroad.....	..	55	1,300,000
Northern Central railroad.....	..	142	12,400,000
Pennsylvania railroad and branches.....	338	..	29,761,533
Susquehanna tidewater canal.....	45	..	1,000,000
York and Cumberland railroad.....	..	44	3,300,000
Cumberland Valley railroad.....	..	81	1,692,111
Franklin railroad.....	..	45	1,643,128
Nesquehoning railroad.....	..	28	500,000
Room Run railway.....	..	6	40,000
Delaware, Lackawanna, and Western railroad.....	..	116	13,988,876
Lackawanna and Bloomsburg railroad.....	..	82	3,753,130
North Pennsylvania.....	..	66	6,669,991
Catawissa, Williamsport, and Erie railroad.....	..	68	3,745,096
Elmira and Williamsport.....	..	78	2,692,000
Pennsylvania Coal Company's railroad.....	..	63	2,745,500
New Jersey Central railroad.....	..	134	18,034,675
Railroads by individuals.....	..	120	1,180,000
Other coal railroads.....	..	1117	37,500,000
Total.....	1,096	3,746	\$261,435,646

COAL MINING.

Coal-beds are discovered and worked by different methods, varying according to the circumstances under which they occur. In regions where they lie among the piles of strata horizontally arranged, and passing with the other members of the group upon a level or nearly so through the hills, their exact position is often detected by their exposure in the precipitous walls of rock along the rivers; or it is indicated by peculiar indentations, known as "benches," around their line of outcrop, caused by their crumbling and wearing away more rapidly than the harder strata above and below them; and again by the recurrence of springs of water

and wet places at the foot of the benches, which point to an impervious stratum within the hill that prevents the water percolating any further down; and lastly, in the little gorges worn by the "runs," the beds are often uncovered, and loose pieces of coal washed down lead to their original source above. However discovered, the method of working them is simple. A convenient place is selected upon the side of a hill, and an excavation called a drift, usually about four feet wide, is made into the coal-bed. The height of the drift is governed by the thickness of the coal-bed and the nature of the overlying slate. Miners sometimes work in drifts only 2½ feet high. Coal-beds three or four feet thick are very common, and are





FIRE-DAMP EXPLOSIONS, RARE IN ANTHRACITE, BUT FREQUENT IN BITUMINOUS MINES.

FLOODING TROUBLESOME, ESPECIALLY IN ENGLISH MINES.





BREAKING OF PROPS AND CAVING IN.

worked without the necessity of removing the overhanging slate, unless it is too unsound to serve as a roof. Beds of ten feet thickness or more require much additional care over those of smaller size, both in removing the coal and supporting the roof; and in many cases it is found expedient to leave a portion of the bed, either at the top or bottom, untouched, especially if the upper layers contain, as they often do, sound sheets of slate. At the entrance of the mines, and in general in all places where the cover is not sound, the materials overhead are prevented from falling by timbers across the top of the drifts, rudely framed into posts set up against the walls on each side; and where the strata are very loose, slabs are driven in over the cross timbers and behind the posts. In such ground the coal cannot be excavated over large areas without leaving frequent pillars of coal and introducing great numbers of posts or props. But previous to abandoning the mine the pillars may be removed, commencing with those furthest in, and all the strata above are thus allowed to settle gradually down. When drifts or gangways have been extended into the coal-beds far enough to be under good cover, branches are commenced at right angles, and a system of chambers is laid out for excavation, leaving sufficient blocks or pillars of coal to provide for the support of the overlying strata. Thus the work is carried on, ventilation being secured by connections made within the hill with gangways passing out in different directions, and sometimes also by shafts sunk from the surface above, or, when these means are not practicable, by ventilating fans worked by hand, and thus forcing air through long wooden boxes which lead into the interior of the mine. Drainage is often a serious trouble, and unless the strata slope toward the outlet of the mine, it can be effected only by a channel cut to the required depth for the water to flow out, or else by the use of pumping machinery. When the strata lie nearly upon a horizontal plane, it is very common for a slight descent to be found from the exterior of a hill toward its centre, as if the beds of rock had been compressed and settled by their greater weight in the middle of the hill. In such positions the coal is extracted with much expense for drainage, and it is therefore an important consideration in judging of the value of coal-beds to ascertain whether or no the water will flow freely out from the excavations. In

the bituminous coal-fields west of the Alleghanies, owing to the general distribution of the coal-beds above the level of the water-courses, it has not yet been found worth while to work any of the beds that are known to lie below this level. Coal must reach a much higher value before beds of the moderate size of those in that region can be profitably explored below water level.

It is rare that bituminous coal is obtained by open quarrying. Where the beds lie near the surface, so that they might be uncovered, the coal is almost invariably in a rotten condition and worthless. Consequently one of the first points to be assured of in judging of the value of a coal-bed is that it has sufficient rock cover. After this may be considered the quality of the coal, its freedom from sulphur, etc., the soundness of its roof, and the facilities offered for drainage and ventilation. The quality of a coal bed undergoes little or no change after it is once reached under good cover beyond atmospheric influences; and hence no encouragement can be given to continue to work a poor bed in hopes of its improving.

Coal is excavated chiefly by light, slender picks. With one of these a miner makes a shallow, horizontal cut as far as he can reach under the wall of coal before him, stretching himself out upon the floor to do this work, and then he proceeds to make a vertical cut extending from each end of that along the floor up to the roof. By another horizontal cut along the roof, a cubical block of coal is thus entirely separated from the bed, except on the back side which cannot be reached. The separation is completed by wedges driven into the upper crevice, or sometimes by small charges of powder. By this means blocks of coal are thrown down amounting to 70 or 80 tons in weight, and with the least possible loss by the reduction of portions of it to dust and fine coal.

The cost of mining and delivering coal at the mouth of the mines, varies with the size and character of the beds. Under the most favorable conditions the horizontal beds of bituminous coal, as those in the hills opposite Pittsburg, have been worked and the coal delivered outside for $1\frac{1}{2}$ cents a bushel, or 45 cents a ton; but in general the total expenses are nearly double this rate. In estimating the capacity of production of coal-beds it is usual to allow a ton of coal to every cubic yard, and a bed of coal a yard thick should consequently contain a ton to

every square yard, or 4840 tons to the acre: but the actual product that can be depended on, after the loss by fine coal, by pillars left standing, etc., may not safely be reckoned at more than 3000 tons, or for every foot thickness of the bed 1000 tons.

In the anthracite region, and in other coal districts where the beds are of large size and lie at various degrees of inclination with the horizon, the methods of mining differ more or less from those described. The anthracite beds frequently extend in parallel layers longitudinally through the long ridges, dipping, it may be, nearly with the outer slope, and descending to great depths below the surface. In such positions they are conveniently reached at the ends of the ridges and in the gaps across these, by a level driven on the course of the bed, and rising just enough for the water to drain freely. A level or gangway of this sort is the great road of the mine, by which all the coal is to be brought out in case other similar gangways are not driven into the same bed at points further up or down its slope. Unless the dip is very gentle, one at the lowest point should be sufficient. At different points along its extension passage-ways are cut in the coal, directed at right angles up the slope of the bed, and as soon as one of them can be brought through to the surface, a ventilating current of air is established, which may afterward be diverted through all the workings. The passage-ways together with other levels above divide the coal-bed into great blocks, and also serve as shutes by which the coal excavated above is sent down to the main gangway. At the bottom of each shute a bin is constructed for arresting the coal and discharging it, as required, into the wagons which are run in beneath on the tracks laid for this purpose. Coal-beds in this position are also worked from the gangway by broad excavations carried up the "breast" or face of the bed, sufficient pillars of coal from 12 to 25 feet long being left in either case to support the roof. These pillars usually occupy the most room just above the gangways, and on passing up between them, the chambers are made to widen out till they attain a breadth of about 40 feet, and thus the breast is extended up to the next level. Props are introduced wherever required to support the roof, and the rubbish, slates, etc., are stacked up for the same purpose, as well as to get them out of the way.

It often occurs that coal beds within the ridges can be reached only by a tunnel driven in from the side of the mountain across their line of bearing. Tunnels of this kind are sometimes extended till they cut two or more parallel coal-beds. Each one may then be worked by gangways leaving the tunnel at right angles and following the coal-beds, and the tunnel continues to be the main outlet of them all.

When it is desirable to obtain the coal from the portion of the bed below the level of the gangway, preparations must first be made for raising the water, which may be done for a time by bucket and windlass, and as the slope is carried down and the flow of water increases, then by mining pumps worked by horse or steam power. The slope may commence from the exterior surface or from the lower gangway of a mine already in operation, and is made large enough to admit wagons, which ascend and descend upon two tracks extending down its floor. At the depth of 200 or 300 feet a gangway is driven at right angles with the slope in each direction on the course of the bed, and from this the workings are carried up the breast as already described. Other gangways are started at lower levels of 100 feet or more each, dividing the mine into so many stories or floors. The coal above each gangway is sent down to its level and is received into wagons. By these it is conveyed to the slope, and here running upon a turn-table, each wagon is set upon the track in the slope and is immediately taken by the steam engine to the surface, another car at the same time coming down on the other track. Reservoirs are constructed upon the different levels to arrest the water, that it may not all have to be raised up from the bottom, and the pumps are constructed so as to lift the water from the lower into the higher reservoirs and thence to the surface. Many mines of this character are opened from the surface, one of which is represented in the cut of the "Colliery Slope and Breaker, at Tuscarora, Pennsylvania." An empty wagon is seen in this cut descending the track from the engine house down into the mouth of the pit, and through the end of the building passes the pump rod which by means of a vibrating "bob" is turned down the pit and works by the side of the track. The men pass down into the mines of this character, sometimes by the wagons, and sometimes by



UNDERMINING COAL.—See page 141



BREAKING OFF AND LOADING COAL



DRAWING OUT COAL WHERE THERE IS NOT SUFFICIENT DEPTH OF VEIN TO ADMIT MULE TEAMS

ladders or steps arranged for the purpose between the two tracks. Though the opening, as represented, appears insignificant for an important mine, such a slope may extend several hundred feet in depth, and many gangways may branch off from it to the right and left, extending several miles under ground in nearly straight lines along the course of the bed. These, however, to secure ventilation, must have other slopes coming out to the surface, and at these may be other arrangements for discharging the coal and water. In extensive mines the gangways are made wide and capacious for the continual passing back and forth of the wagons drawn by mules. These animals once lowered into the mine are kept constantly under ground, where they are provided with convenient stables excavated from the coal and rock. The men continue at work from eight to ten hours, and in well-ventilated mines the employment is neither very laborious, hazardous, nor disagreeable. The pursuit has, however, little attraction for Americans, and is mostly monopolized by Welsh, English, Irish, and German miners.

In the anthracite region there have been some remarkable instances of open quarries of coal. That of the Summit mine of the Lehigh is unsurpassed in the history of coal mining, for the enormous body of coal exposed to view. The great coal-bed, which appears to have been formed by a number of beds coming together through the thinning out of the slates that separated them, arches over the ridge, forming the uppermost layers of rock, and dipping down the sides at a steeper angle than their inclination. It thus passes beneath the higher strata. On the summit a thin soil, formed chiefly of the decomposed coal itself, covered the beds and supported a growth of forest trees. For several feet down the coal was loose and broken before the solid anthracite was reached. As the excavations were commenced and carried on from this point, it appeared as if the whole mountain was coal. Shafts were sunk into it and penetrated repeated layers of anthracite, separated by thin seams of slate, to the depth, in some places, of more than 55 feet. The work of stripping off and removing the covering of yellow and greenish sandstones and refuse coal was carried on, till the quarry had extended over about 50 acres, and on the north side the overlying sandstone, which had been steadily increasing in thickness, presented a wall of

30 to 40 feet in height. Over this area rail tracks were laid for removing the waste northward to the slope of the hill toward the Panther Creek valley; and when the piles thus formed had grown into large hills, the rubbish was deposited in the spaces left after the coal had been removed. During the progress of this work the scenes presented were of the most picturesque and novel character. The area laid bare was irregularly excavated into steps, upon which temporary rail tracks were laid in every direction. Upon these the wagons were kept busily running, some carrying off the coal, some loaded with slates and waste, and others returning empty for their loads. Here and there stood huge isolated masses of anthracite, with their covering of sandstone, soil, and the relics of the original forest growth, reaching to the height of 50 or 60 feet, monuments of the vast amount of excavation that had been carried on, and presenting in their naked, vertical walls, fine representations of the extraordinary thickness of the bed and of the alternating layers of slate and coal of which it was composed. In the accompanying cut of the great open quarry of the Lehigh is represented one of these blocks. Gradually these masses disappeared as the miners continued their operations; but in the boundary walls of the quarry there are still to be seen black cliffs of solid coal more than 50 feet high, and overtopped by a wall of yellow sandstone of nearly equal additional height. Under these walls operations have been carried on by the regular system of underground mining. From ten acres of the quarry it has been estimated that 850,000 tons of coal have been sent away, the value of which in the ground at the usual rate of 30 cents per ton, would be \$255,000, or \$25,500 per acre. Estimating the average working thickness of the coal in this part of the coal-field, from the Little Schuylkill to Nesquehoning, at 40 feet, which according to the report of the state geologist is not exaggerated, every available acre contains not less than 65,000 tons. The expense of extracting and preparing the coal from the great bed for market, is stated by the same authority to be 37½ cents per ton for mining and delivering ready for breaking and cleaning. For this operation 12½ cents; and for raising it to the summit and running it to Mauch Chunk 25 cents.

Another locality where coal has been

worked by open quarrying is at the mines of the Baltimore Company, near Wilkes-barre. Here, too, an immense bed of coal was found so close to the surface that it was easily uncovered over a considerable area. As the overlying slates and sandstone increased in thickness, it was found at last more economical to follow the coal under cover; and it was then worked after the manner of mining the bituminous coal-beds west of the Alleghany Mountains. Horizontal drifts 25 feet high, which was the thickness of the bed, were carried in from the abrupt wall, several of them near together and separated by great pillars of coal left to support the roof. The gangways were so broad and spacious that a locomotive and train of cars might have been run into the mine. Within they were crossed by a succession of other levels, and through the wide spaces thus left open, the light of day penetrated far into the interior of the hill, gradually disappearing among the forest of black pillars by which it was obstructed and absorbed.

In the anthracite region, several coal-beds of workable dimensions are often found in close proximity, so that when dipping at a high angle they are penetrated in succession by a tunnel driven across their line of bearing. Larger quantities of coal are thus concentrated in the same area than are ever met with in the bituminous coal-field. In the northern coal-fields, between Scranton and Carbondale, tracts have brought \$800 or more per acre, and single tracts of 650 to 700 acres are reported upon by competent mining engineers as containing five workable beds, estimated to yield as follows—each one over nearly the whole area: one bed working 7 feet, 11,200 tons per acre; a second, working 8 feet, 12,800 tons per acre; a third, 6 feet, 9600 tons per acre; a fourth, the same; and a fifth, 3 feet, 4800 tons—altogether equalling a production of 48,000 tons per acre, from which 20 per cent. should be deducted for mine waste, pillars, etc.

The anthracite as usually brought out from the mines is mostly in large lumps of inconvenient size to handle. In this shape it was originally sent to market, and when sold to consumers a man was sent with the coal to break it up in small pieces with a hammer. At present every mine is supplied with an apparatus called a coal-breaker, which is run by steam power, and which crushes the large pieces of coal in fragments. It consists of

two rollers of cast iron, one solid, with its surface armed with powerful teeth, and the other of open basket-work structure. These revolve near together, and the coal, fed from a hopper above, is broken between them, and the pieces discharged below into another hopper are delivered into the upper end of a revolving cylindrical screen, made of stout iron wire, and set on a gentle incline. The meshes of this screen are of four or more degrees of coarseness. At the upper end the finer particles only drop through; passing this portion of the screen, the coarser meshes which succeed let through the stove coal sizes, next the "egg coal," and next the "broken coal," while the coarsest pieces of all, called "lump coal," are discharged through the lower end of the screen. Under the screen are bins or shutes, separated by partitions, so as to keep each size by itself. Their floor slopes down to the railway track, and each bin at its lower end is provided with a trap-door, through which the coal is delivered as required into the wagons. The general plan of this arrangement is seen in the preceding wood-cut of the Colliery Slope and Breaker at Tuscarora. The coal wagons are here run from the mine up into the top of the engine house, and thence through the building to the breaker at the upper end of the slope over the shutes. As the coal falls from the screen into these, boys are employed, one in each bin, to pick out and throw away the pieces of slate and stone that may be mixed with the coal. This they soon learn to do very thoroughly and with great activity; and upon the faithfulness with which their work is done depends in no small measure the reputation of the coal.

USEFUL APPLICATIONS.

While anthracite, by reason of its simple composition, is fitted only for those uses in which the combustion or oxidation of its carbon is required to generate heat, or else to extract oxygen from other substances, the bituminous coals, containing a greater variety of ingredients, serve to produce from their volatile ingredients illuminating gas and coal oils. These two subjects will be treated in distinct chapters, and that upon the oils may properly include an account of the petroleum wells which have come within the past ten years to furnish so large and important an item of our exports and home consumption.

CHAPTER X.

ILLUMINATING GAS.

THE supply of artificial light in abundance and at little cost is one of the most important benefits which science and mechanics can confer. It contributes not merely to physical comfort and luxurious living, but supplies the means to multitudes of obtaining instruction during those hours after the cessation of their daily labors, which are not required for sleep, and which among the poor have in great measure been spent in darkness, on account of the expense of artificial light. At the present day it is not unusual, in the less cultivated portions of the country, to see a farmer's family at night gathered around a blazing fire, and some among them seeking by its fitful light to extract the news from a public journal, or perhaps conning their school tasks, and making some attempts at writing or ciphering; and when the hour to retire has come, the younger members disappear in the dark, and the more honored are favored with a home-made tallow candle, just sufficient for this use, and endurable only to those who are unaccustomed to a more cleanly and efficient method of illumination. With the advance of cultivation and learning, the demand for better light has increased the more rapidly it has been met. The sea has been almost exhausted of whales for furnishing supplies of oil. The pork of the West has been largely converted by new chemical processes into lard oil and the hard stearine for candles; and numerous preparations of spirits of turpentine, under the name of camphene and burning fluid, have been devised and largely introduced with ingenious lamps contrived to secure the excellent light they furnish, with the least possible risk of the awful explosions to which these fluids are liable when their vapor comes in contact with fire. The bituminous coals have been made to give up their volatile portions—by one process to afford an illuminating gas, and by another to produce burning oils; and the earth itself is bored by deep wells to exhaust the newly-found supplies of oil gathered beneath the surface at unknown periods by natural processes of distillation. The resinous products of the pine tree are applied to the production of oil and gas for the same purposes; and peat, wood, and other

combustible bodies—even water itself—are all resorted to as sources from which the cry for “more light” shall be satisfied.

The distillation of carbonaceous and bituminous substances to obtain an illuminating gas is a process, the practical application of which hardly dates back of the present century. The escape of inflammable gases from the earth, in different parts of the world, had been observed, and the phenomenon had been applied to superstitious ceremonials, especially at Bakoo on the shores of the Caspian. The Chinese are said to have applied such natural jets of gas to purposes of both illumination and heating; but the first attempts to light buildings by gas distilled from bituminous coal were made about the year 1798 by Mr. Murdock in the manufactory of Messrs. Boulton and Watt, at Soho, England, and about the same time in France by a Frenchman named Le Bow. The London and Westminster Chartered Gas Light and Coke Company was incorporated in 1810, and Westminster bridge was lighted with gas, Dec. 31, 1813. The process was introduced into this country about the year 1821. Some attempts had been made at an earlier date, as in Baltimore according to some statements in 1816, and in New York four years before this. In the *New York News* of August 15, 1859, is an account of the efforts made by Mr. David Melville of that city to establish the use of coal gas in 1812. He lighted his own house with it, and then a factory at Pawtucket. He also succeeded in having it applied to one of the light-houses on the coast of Rhode Island, and for one year its use was continued with success. But on account of the disturbed state of the times and the prejudices against the use of a new material, the enterprise fell through. In 1822 the manufacture of gas was undertaken in Boston; and the next year the New York Gas Light Company was incorporated with a capital of \$1,000,000. The works, however, were not completed and in operation until 1827. Another company, called the Manhattan Gas Light Company, was incorporated in 1830 with a capital of \$500,000, which has since been increased to \$4,000,000. Such were the beginnings of this branch of manufacture, which has of late rapidly extended itself throughout all the cities and many of the towns of the United States, having works in operation representing a capital of

Within the last twenty years the use of gas has increased with great rapidity throughout the cities and towns of the United States. In 1860, the number of companies manufacturing gas was, according to the statements of the *American Gas Light Journal*, 433, representing a capital of about \$59,000,000. In 1870, the number of companies had increased to somewhat more than 800, and the capital represented to over 112,000,000, thus ranking with the most important branches of industry in the country. The capital of the gas companies of the State of New York, is stated by Mr. Wells in his Report on Local Taxation, to have been \$20,000,000 in 1870, and in this estimate many of the smaller companies are overlooked. The capital of the gas companies of New York and Brooklyn in 1871 was over \$14,000,000. There are certainly five and probably six companies whose annual production exceeds 1,000,000,000 cubic feet, and several others are approximating to that amount. The price per thousand feet has varied greatly in different sections, and has fluctuated in all cases with the price of the coal and in its

production. In New York city and Brooklyn, it has ranged from \$2.00 to \$4.50, standing at present at \$3.25, but with a promise of reduction soon to \$2.75. In Philadelphia, where the city manufactures for its citizens, it is now, we believe, \$2.25, and in Pittsburg has been as low as \$1.50. In the smaller cities it ranges from \$4.00 to \$8 00 per thousand feet. On the Pacific coast, owing to the high price of gas-producing coals, it has been as high as from \$8.00 to \$14.00 per thousand feet. If the Rocky Mountain coals prove to be of good quality for the production of gas, the cost will be materially lessened. Notwithstanding the consumption of petroleum oils, there has been an increase in the demand for illuminating gas, and the plans proposed for its production from other hydrocarbons, or by new processes, have generally failed, so that there seems to be a probability of the continued production of gas from coals. What new methods of illumination the next twenty years may develop we cannot say; but it is certain that a cheap, safe, and brilliant illuminator is still a thing to be desired.

SOME OF THE PRINCIPAL GAS LIGHT COMPANIES IN THE UNITED STATES.

Chartered.	Localities.	Chartered capital.	Approximate annual production. Cubic feet.	Prices to private consumers per 1000 cubic feet.	Average cost of coal used per ton.
1830,	Manhattan, N. Y.	\$4,000,000	725,321,000	\$2 50	\$6 50 to \$11 00
1823,	New York, N. Y.	1,000,000	430,000,000	2 50	.. ..
1825,	Brooklyn, N. Y.	2,000,000	163,000,000	2 00	7 28 to 8 15
1859,	Citizens' Co., Brooklyn.	1,000,000	.. ..	2 00	.. ..
1841,	Philadelphia.	3,000,000	432,000,000	2 25	6 50 ..
	Northern Liberties.	400,000	70,000,000	2 50	6 29 ..
1822,	Boston, Mass.	1,000,000	200,000,000	2 50	5 00 to 12 00
1851,	Cincinnati, Ohio.	1,600,000	96,708,900	2 50	3 40 ..
1849,	Chicago, Ill.	1,300,000	86,250,810	3 50	5 78 ..
1846,	Charleston, S. C.	723,800	.. ..	4 00	.. ..
1839,	St. Louis, Mo.	600,000	74,500,000	3 50	7 50 ..
1835,	Pittsburg, Penn.	300,000	54,720,000	1 50	1 25 ..
1848,	Providence, R. I.	1,000,000	41,437,883	3 00	7 20 ..
1845,	Albany, N. Y.	250,000	40,250,000	3 00	6 75 to 8 00
1838,	Louisville, Ky.	600,000	33,750,000	2 70	.. ..
1850,	Williamsburg, N. Y.	500,000	33,493,082	3 50	6 25 to 9 50
1848,	Troy, N. Y.	200,000	28,000,000	3 60	7 20 ..
1851,	Richmond, Va.	341,975	27,000,000	3 00	4 15 ..
1852,	Rochester, N. Y.	200,000	25,000,000	2 50	5 38 ..
1849,	Lowell, Mass.	200,000	21,000,000	3 25	6 50 ..
1848,	Cleveland, Ohio.	200,000	20,000,000	3 00	4 25 ..
1849,	Detroit, Mich.	500,000	20,000,000	3 50	5 00 ..
1853,	Jersey City, N. J.	300,000	19,234,000	3 00	7 89 ..
	Milwaukee, Wis.	400,009	19,049,560	3 50	6 00 ..
1849,	Hartford, Conn.	200,000	15,000,000	3 00	8 68 ..
1849,	Portland, Maine.	250,000	.. ..	3 50	.. ..
1857,	Columbia, California.	50,000	.. ..	10 00	.. ..
1852,	San Francisco, "	1,000,000	.. ..	8 00	.. ..
1858,	Marysville, "	50,000	.. ..	12 50	.. ..
	Stockton, "	50,000	.. ..	10 00	.. ..
1857,	Sacramento, "	500,000	.. ..	10 00	.. ..

TOTAL OF GAS COMPANIES IN THE UNITED STATES FROM RETURNS OF JULY, 1860.

State.	Companies.	Capital.	Coal gas.	Average price.	Rosin gas.	Average price.
Alabama.....	3	\$320,000	3	\$5 16	..	..
Arkansas.....	None.	..	..	..	..	..
California.....	9	1,790,000	9	10 05	..	..
Connecticut.....	14	953,000	14	3 83	..	..
Delaware.....	3	244,300	3	3 50	..	..
District of Columbia.....	1	500,000	1	3 25	..	..
Florida.....	1	30,000	1	7 00	..	..
Georgia.....	6	559,160	4	4 68	2	\$6 50
Illinois.....	13	2,595,000	13	3 91	..	..
Indiana.....	7	605,000	7	3 97	..	..
Iowa.....	5	355,000	5	4 40	..	..
Kansas.....	1	200,000	1	5 00	..	..
Kentucky.....	5	905,000	5	4 04	..	..
Louisiana.....	2	1,540,000	2	4 50	..	..
Maine.....	10	905,300	9	3 90	1	7 00
Maryland.....	6	780,000	3	3 49	3	6 60
Massachusetts.....	49	4,759,000	45	3 43	4	6 37
Michigan.....	8	745,000	8	3 78	..	..
Minnesota.....	1	200,000	1	6 00	..	..
Mississippi.....	4	212,000	4	4 75	..	..
Missouri.....	4	775,000	4	4 50	..	..
New Hampshire.....	9	425,000	9	3 98	..	..
New Jersey.....	19	1,849,610	17	3 72	2	6 50
New York.....	71	12,780,250	61	3 70	10	6 70
North Carolina.....	8	187,000	..	..	8	5 93
Ohio.....	30	3,338,600	29	3 85	1	7 00
Oregon.....	1	50,000	1	8 00	..	..
Pennsylvania.....	48	5,657,700	48	3 55	..	..
Rhode Island.....	7	1,344,000	6	3 58	1	7 00
South Carolina.....	2	767,800	2	5 00	..	..
Tennessee.....	4	663,000	4	4 00	..	..
Texas.....	3	225,000	3	6 33	..	..
Vermont.....	8	216,000	6	4 25	2	6 50
Virginia.....	11	1,030,000	10	3 68	1	7 00
Wisconsin.....	8	778,500	8	4 44	..	..
Not enumerated above.....	50	6,200,000	50	..	..	..
Grand total.....	431	\$59,111,215	396	..	35	..

The preparation of illuminating gas from bituminous coal, wood, rosin, and other bodies of organic nature, is a chemical process, too complicated to be very fully treated in this place. When such bodies are introduced into a retort and subjected to strong heat, the elements of which they consist, as carbon, hydrogen, oxygen, and nitrogen, resolve themselves into a great variety of compounds, and escape (with the exception of a fixed carbonaceous residue of charcoal or of coke) through the neck of the retort in the form of gas or vapors, some of the latter of which condense on cooling into liquids and solids. These compounds are rendered more complicated by appropriating the elements of air and moisture that may be present in the retort or in the crude material, and also of the foreign substances or impurities contained in the latter. In processes of this kind, the products vary greatly in their character and relative proportions according to the degree of heat employed,

and the rapidity with which the operation is conducted. The object in this special distillation is to obtain the largest proportion of the gases richest in carbon, particularly that known as olefiant gas, which consists of 86 parts by weight of carbon and 14 of hydrogen, represented by the formula C_4H_4 . This and some other gaseous hydrocarbons of similar composition, or even containing a much larger amount of carbon in the same volume, and hence having a correspondingly greater illuminating capacity, it is found, are produced most freely from carbonaceous substances which contain a large proportion of hydrogen compared with that of oxygen. Many of the common bituminous coals contain about 5.5 per cent. each of hydrogen and oxygen, the rest being carbon. Boghead cannel of Scotland contains 11 per cent. of hydrogen and 6.7 of oxygen; rosin 10 per cent. hydrogen and 10.6 oxygen; wood 5.5 hydrogen and 44.5 oxygen. Of such compounds the cannel

yields the richest gas and in largest quantity. Still, as will be more fully explained hereafter, the process may be so conducted as to obtain chiefly liquid instead of gaseous products. With the olefiant gas and the others of similar composition, a number of other gases also appear, some of which seem to be essential for producing the effect required in illuminating gas, though they do not themselves afford light by their combustion. Their part is rather like that of nitrogen in the atmosphere, to moderate the intensity of the more active agent of the mixture. Such are the light carburetted hydrogen, carbonic oxide, and hydrogen, all of which are inflammable, but possess little or no illuminating power. The first named contains in an equal volume only half as much carbon as olefiant gas, its composition being represented by the formula C_2H_4 , and if its proportion is too great for the purpose it serves as a diluent, the quality of the gas is impaired, and must be corrected by the use of richer material or increased care in the process.

The light produced by the combustion of gas is variable, not only according to the quality of the gas, but also according to the manner in which it is burned. If its elements undergo the chemical changes which constitute combustion simultaneously, the hydrogen combining with the oxygen of the air to form aqueous vapor, and the carbon with oxygen to produce carbonic acid, no yellow flame appears, but instead of this, a pale blue flame like that of hydrogen alone. Such an effect is produced when air is thoroughly intermixed with the gas as it passes through a tube to the jet where it is ignited. But if the conditions of the combustion are such that the hydrogen burns first and appropriates the oxygen in contact with the gas, the particles of carbon are brought to an incandescent state and produce the yellow light before they reach the oxygen with which they combine. The particles may even be arrested while *in transitu* and be deposited upon a cold surface in the form of soot. The greatest heat is produced with the most thorough mode of combustion and the appearance of the pale blue flame; and lamps designed to give great heat are now in general use among chemists, in which gas is burned in this manner. When the air is impelled by a bellows they even produce an intensity of heat sufficient for many crucible operations.

If too much carbon be present a part of it escapes unconsumed and produces a smoky flame, hence the necessity of the diluents or gases deficient in carbon for neutralizing the too large proportion of those gases richest in carbon. The noxious compounds in illuminating gas, and which should be as far as possible extracted from it before it is delivered for consumption, are the sulphurous ingredients formed by the combination of the sulphur of the iron pyrites commonly present in bituminous coals with the carbon, and with the hydrogen and the ammoniacal products. They are the highly offensive sulphurets of carbon, the sulphuretted hydrogen, etc. Carbonic acid, nitrogen, oxygen, carbonate of ammonia and aqueous vapors are to be regarded as foreign substances, though always present to some extent in the gas.

The liquids generated by the distillation mostly condense in two layers on cooling, the upper an aqueous fluid, rendered strongly alkaline by the ammoniacal compounds in solution; and the lower a black tarry mixture commonly known as coal tar, which is composed of more than a dozen different oily hydrocarbons, as benzole, tuluole, etc., and contain in solution the solid oily compounds of carbon and hydrogen, as naphthaline, para-naphthaline, and several others. Many of these are likely to prove of considerable practical importance. Benzole is a highly volatile fluid, a powerful solvent of the resins, india-rubber, gutta percha, greasy matters, etc. A most beautiful light is produced by the flame of benzole mixed with due proportions of common air, and the mixture is effected by passing a current of air through the fluid, the vapor of which it takes up and carries along with it. The difficulty attending this application is the condensation of the benzole and its separation from the air at temperatures below 50° . Above 70° too much vapor is taken up, and the effect is a smoky flame. In Europe much attention has been directed to the separation of the more hidden products of coal tar; and among these the following are enumerated in a statement exemplifying the rapid increase in the value of these products as they are obtained by more extended researches. Benzole worth about 25 cents a pound; nitro-benzole, a substance having the odor and taste of bitter almonds and used as a flavoring, worth, crude, 70 cents, or refined, \$1.50 per pound. The or-

dinary aniline dye for producing the mauve color, \$4.50 to \$8 per pound, and the pure aniline violet in powder \$240 to \$325 per pound, or about its weight in gold.

Gas works established in cities and towns are commonly built in places where the property and buildings around are least likely to be injured by the escape of the products, and rather upon a low than a high level, for the reason that the gas on account of its lightness compared with the atmospheric air ascends more freely than it descends to its points of communication with the external air. The works consist of the apparatus for distilling the coal and receiving the products of the distillation, that for purifying the gas, and that for conveying it to the places where it is consumed, and there measuring the quantities supplied to each customer. The retorts in general use are either of cast iron or of fire clay. The latter are a late improvement highly recommended, and introduced at the present time into a few of the gas works. Various forms have been tried; the most approved are of $\cap$ shape, 7 to 9 feet long, 1 or 2 feet wide, and 12 or 15 inches high. They are set in the furnace stacks, commonly two on the same horizontal plane, two more over these, and a fifth at the top. A single furnace fire below is sufficient for heating them, and the capacity of the works is increased by multiplying these fires along the length of the stacks. Sometimes the stacks are made double, so as to take two retorts set end to end, each opening on opposite sides of the stack. In place of two retorts a single long one has been substituted, passing entirely through and having at each end an opening for charging and discharging. In large establishments as many as 600 or more retorts may be set, all of which may be kept employed in the winter season, when the consumption of gas is largest. The outer end of each retort projects a little way in front of the wall of the furnace, and is provided with a movable mouth-piece covering the entire end, which may be readily removed for admitting the charge of coal. Upon the top of this projecting end or neck stands the cast-iron pipe of about 4 inches in diameter, called the stand pipe, through which the volatile products pass from the retort. It rises a few feet, then curves over back, and passes down into a long horizontal pipe of large diameter, which is laid upon the outer edge of the brick-work, and extends the

whole length of the furnace stacks. This is called the hydraulic main, and into it all the volatile products from the retorts beneath are discharged. It is kept about half filled with water or the liquid tarry matters, and the dip pipes terminate about three inches below this fluid surface. By this arrangement the retorts are kept entirely independent of each other, while their products all meet in one receptacle.

In manufacturing gas it is found necessary to introduce the charge into the retorts already at a full red heat, and bring it as rapidly as possible to the high temperature required for producing the richest gaseous hydrocarbons. A low and slowly increasing heat causes the ingredients of the charge to form a large proportion of liquid and oily substances, and little gas. It is only while the coal is approaching a vivid red heat that the best gaseous mixtures are obtained; and even these are deteriorated by change in the composition of the olefiant and other rich gases of which they are in part composed, if the mixture is exposed to too high temperature, or remains in contact with red hot surfaces of iron. The duration of the charge used formerly to be from 8 to 10 hours; but from the observations of the qualities of the gases evolved at different stages of the process, it has gradually been reduced to 4 to 6 hours, varying according to the character of the coal employed. The richest gases are obtained in the first hour, and after this the proportional quantity per hour steadily diminishes at the same time that the quality gradually deteriorates. The temptation, however, to obtain the largest amount of a commodity which is sold only by measure, and to consumers who have no means of assuring themselves of its real quality, no doubt often leads to extending the operation to the separation of gaseous mixtures having very little illuminating power. The manufacturers knowing their materials, and checking their operations by regular photometrical tests, can control the quality of the product as they see fit.

In order that the least loss may be incurred in bringing the charge up to the proper temperature, the retorts are kept at a full red heat; and when ready for a new charge the mouth-piece is partially removed, and the gas that escapes is ignited. When the danger of explosion by sudden admission of air has passed the lid is removed, and the red hot coke is raked out and quenched with water.

The new charge is then introduced by means of a long iron scoop bent up at the sides, which is pushed into the retort, and being turned over, discharges its contents. The mouth-piece is then replaced, and tightly secured with a luting of clay or lime. It is obvious that the more perfectly the coal is freed from moisture, the better must be the gas; and if it were also first somewhat heated, the result would be still more satisfactory. The coals employed at the different gas works of the United States are generally mixtures of the caking coals of the interior, or of those of Richmond, Virginia, and of Nova Scotia, with cannel coal, which for the cities near the coast is imported from Great Britain, and for those in the interior is obtained from the mines of this coal in western Virginia and in Kentucky. The larger the proportion of cannel, the better should be the gas, under the same method of manufacture. In the works in New York city, the proportion of cannel is generally from one third to one fourth of the whole. Other establishments generally use a less proportion of it. The amount of gas it may produce varies with the kind of cannel from 9500 cubic feet to the ton to 15,000 cubic feet. The last is the yield of the Boghead cannel. In general, the greater the yield the better also is the quality of the gas, as is indicated by its increased specific gravity, that of the cannel last named being .752, while the gas from other cannels yielding about 10,000 cubic feet may not exceed .500. The best Newcastle coals are not inferior, either in the amount or quality of the gas they afford, to most of the cannels. They produce about 12,000 cubic feet of gas to the ton, and of specific gravity sometimes exceeding .550 or even .600. The specific gravity is not depended upon as a certain test of the quality of the gas, the density of which may be increased by presence of impure heavy gases, or even of atmospheric air; but it is resorted to only as an indication in the absence of more exact tests.

The coke obtained from the retorts, amounting to about 40 bushels to the ton of coals, furnishes all the fuel required for the fires beneath, and three times as much more, which is sold for fuel. As the volatile products pass through the hydraulic main, the principal portions of the oily and ammoniacal compounds are deposited in it; but some of these pass on in vapors, and would, if not separated, cause obstructions

in the pipes in which they might condense in liquids and solids. They are consequently passed through a succession of tall iron pipes standing in the open air, and sometimes kept cool by water trickling down their outside. A pipe from the bottom of each pair conveys the condensed tar and ammonia into a cistern in the ground. To still further separate the condensable portions, the gas at some works is next passed into the bottom of a tower filled with bricks, stones, etc., among the interstices of which it finds its way up, at the same time that water constantly sprinkled on the top is working down and keeping the whole cool. The water washes away the remaining ammonia; but it is to be feared that it also removes some of the richest hydrocarbons, and the use of the wet scrubber, as it is called, is already abandoned at some of the gas works for similar methods of condensing, except that the water is dispensed with. The gas makes its exit from the top of the scrubber; and its passage being already somewhat impeded so as to throw considerable pressure back into the retorts, thus effecting chemical changes in the gas, which impair its quality, it is found necessary to introduce a revolving exhauster, which takes off this pressure, and at the same time propels the gas forward into the succeeding apparatus. This is first a purifier, the object of which is to arrest the carbonic acid and sulphurous gases. Dry quicklime, and also the solution of this in water, known as milk of lime, have the property of absorbing these gases as they are made to pass among the particles of the one spread upon shelves, or interspersed among a porous substance such as dry moss; or to bubble up through the aqueous solution. The lime as it becomes saturated with the impure gases is replaced with fresh portions.

The cleansing process is now complete, and the gas is in proper condition to be delivered to the consumer. It must first, however, be measured, that a record may be kept of the quantity produced, and it is next conducted into the great gas-holders in which it is stored. The measurement is effected by means of a large station meter, constructed on the principle of the small service-meters, with one of which each consumer is supplied. A revolving drum with four compartments of equal capacity is made to rotate in a tight box by the gas entering and filling one of these compartments after another.

Their capacity being known, and the number of revolutions being recorded by a train of wheel-work outside the box, the quantity of gas which passes through is exactly indicated. The largest meters pass about 650 cubic feet by one revolution of the drum, or about 70,000 cubic feet in an hour.

The gas-holders are the large cylindrical vessels of plate iron, the most conspicuous objects at the gas works. Each one is set with its open end down, and immersed in a cistern of water of diameter a little exceeding its own. It is buoyed up by the water, and also counterbalanced by weights passing over pulleys. The gas admitted under the inverted cylinder lifts this up, and fills all the portion above the water. The weight of the cylinder when the influx is shut off, and the discharge pipes are opened presses the gas out and through the mains to the points where it is consumed. The gas-holders of the largest works are of immense size. In Philadelphia, there is one 160 feet in diameter and 95 feet high, holding 1,800,000 cubic feet of gas. Even this is exceeded by one at the Imperial Gas Company's works, London, which is 201 feet in diameter, 80 feet high, and of the capacity of 2,500,000 cubic feet. This cost upward of \$200,000; and contains 1500 tons of iron, 5000 cubic feet of stone work, and 2,000,000 bricks. No advantage is gained in a single structure of this immense size over several smaller ones. On the contrary, this involves heavy expenditures to protect them against the force of the wind, and render them manageable. Those of great height are made in sections, which shut one within another in descending, like the parts of a telescope. As each section is lifted in turn out of the water, its lower edge, which is turned up in an outward direction, forming an annular cup, includes a portion of water, into which the upper edge of the next lower section catches, being turned over inward for this purpose. A gas-tight joint between the two sections is thus formed.

To insure uniformity of pressure, as the gas enters the mains it is first made to pass through the apparatus called a governor, in which, according to the force or slowness with which it moves, it causes a valve to rise and partially close an aperture within the machine through which the gas flows, or to descend and open this aperture. The increase of pressure as the gas is carried to higher levels, amounting to one fifth of an

inch of water in every 30 feet, renders it important in hilly towns to have governors upon different levels. In high buildings a very sensible difference is perceived in the force with which the gas issues from the burners on the different stories. This involves a waste of gas where the pressure is great, for under such conditions a considerable portion of that consumed adds little to the illuminating effect. Various governors or regulators have been devised for the use of consumers with a view of producing an increase of light with reduced consumption of gas; and when judiciously applied, some of them, as Kidder's and Stirling's, have proved very successful. The latter has been introduced into some of the public buildings of New York city, controlled by the Street Department, and according to the report of the Street Commissioner, the saving has been in many instances very remarkable.

Each consumer of gas is supplied with a meter, which is under the control of the gas company; and from its indications the amount furnished is determined by inspection every month.

Though in the use of gas the consumer is in a great measure dependent on the manufacturer as regards the economy of the light, there are several points, by giving personal attention to which, he may more fully realize the saving it affords. In the first place, he must be aware that every one employing this source of light uses it more freely than that derived from lamps and candles. It is enjoyed with so little trouble and apparent cost, that much more light is soon regarded essential, than was perfectly satisfactory under the old methods of producing it. He should next see that the area of the delivery pipe bears such proportion to the quantity usually required, that there is no undue pressure upon the burners, as is evident when the gas "blows" through them as it burns. This should be checked by shutting off a part of the supply by means of the stop-cock at the meter; and this should be looked to after every visit of the gas man to the meter. The regulator also is intended to remedy this over supply, but it may still be necessary to keep part of the gas turned off, and by so doing the regulator may be dispensed with. Attention should next be directed to the burners, that those of largest size, such as consume with the ordinary pressure six feet or more of gas an hour, should be placed only where the greatest quantity of light is

required, and that burners of four feet, three feet, two feet, or even one foot an hour, be placed where the light they give will be sufficient. The burners called Scotch tips, giving what is called the fish-tail flame, are in common use, but a great variety of others have been contrived, and some of them are highly recommended for affording more light with the same amount of gas. All, however, are liable to become foul after a time, and should be occasionally cleaned or replaced. The iron of which they are made is corroded by the ingredients of the gas, especially when not in use, and air entering its elements form acid compounds with those of the gas which remain in the open portion of the pipe. The argand burner is recommended for the powerful and steady light it gives, but it is far from being economical, and moreover produces great heat. For a steady light Gleason's "American gas-burner" combines the advantages of brilliant light, steadiness of flame, and moderate consumption.

The quality of gas is determined either by analysis, or more conveniently by testing with the photometer its comparative capacity of producing light. The standard adopted for comparison is spermaceti candles, each one burning 120 grains in an hour. An argand burner consuming five feet of gas an hour (the quantity carefully proved by the meter) is used in making the trial; and the number of candles required to produce an equal amount of light indicates the quality of the gas. At the points of consumption this is sometimes inferior to that of the gas at the works before it enters the gas-holders and passes through the mains; but in very cold weather, by the condensation of the richest hydrocarbon vapor in the pipes, the gas that reaches the burners is poorer than that which left the works. Consequently these facts should be taken into consideration in estimating the quality of gas furnished by any establishment. Again, after a period of excessive cold weather, when the gas has burned dimly by the condensation of its best portions in the pipes—it may be to the extent at times of obstructing the flow through them—and with the return of milder weather the vapors are released and mix with the new gas, they sometimes so overburden this with an undue proportion of the richest compounds, that with the ordinary burners the gas cannot be consumed, and the result is a smoky flame, of which the consumers make great complaint, believing it to be

caused by inferior gas. Such are some of the causes, over which the manufacturers have no control, that involve more or less irregularity in the quality of the gas supplied.

The gas produced at different works is of various qualities. That of the Manhattan Gas Light Company is rated at sixteen candles, and is probably as good as any furnished in our cities. It is tested daily with the photometer at their office, at the corner of Irving Place and Fifteenth street, New York. In England, the gas of the London works varies from eleven to eighteen candles. That of Liverpool is much better, sometimes being equal to twenty-two candles.

Other materials than coal have been applied to some extent in the United States for producing gas, chiefly for small supplies for single buildings. The most successful of these processes is that with rosin oil. The apparatus is exceedingly simple, and is placed in an apartment in an out-building. It consists of a stove containing a chamber in the top, into which the rosin oil is allowed to drop slowly. It is decomposed by the heat of the surface upon which it falls, and the gaseous products pass immediately through the pipes into the gas-holder, whence they are distributed as at the large gas works. The supply for a week may be made in less than an hour with very little attention from the person in charge. The gas is superior to that from coal, and the expense, not reckoning the cost of the gas-holder and the apparatus, is less than the price ordinarily paid for gas.

In Philadelphia wood has been successfully used at the Market street bridge works. Six retorts have been kept in operation with it for some time, and the yield and quality of the gas have proved very satisfactory. As in the use of coal, it is found necessary to charge the material into retorts already at a high heat, otherwise the gaseous products have little illuminating power. Gas thus made from pine wood has been found to contain 10.57 per cent. of olefiant gas, and that from oak 6.46 per cent.

HYDROCARBON GAS.—What is known as the hydrocarbon or water gas manufacture was introduced into Philadelphia in 1858, and according to the published reports, its application to lighting a portion of the Girard House in that city, proved for several months perfectly satisfactory. It was introduced into the town of Aurora, Indiana, in January, 1861, and according to the statements pub-

lished in the Cincinnati *Daily Commercial*, the operation had been very successful. The light is described as very brilliant, and the gas almost free from odor. The process appears to be similar to that of Mr. White, of Manchester, England, which consists in the generation of the non-illuminating gases by the action of steam upon charcoal highly heated in a retort, the aqueous vapor being thereby decomposed, and various gaseous compounds produced by its hydrogen and oxygen combining with the carbon of the charcoal. If the operation is properly conducted these compounds should be almost entirely carbonic oxide and free hydrogen; if carbonic acid is produced, as it may well be, even to the extent of one per cent., it may involve the expense of purification by means of a lime purifier. These gases are immediately passed through another retort, in which the illuminating gases are generated, and mixing with them the whole is immediately swept forward out of the reach of the high decomposing temperature. The material employed for furnishing the illuminating gas is either rosin or rosin oil gradually dropped into the heated retort; and it is stated that various other carbonaceous substances, as the tar from the gas works and cheap greasy compounds, may be economically applied.

Although this method of producing gas has been highly recommended by eminent English authorities, especially by Dr. Frankland, an account of whose experiments and conclusions is given in the recent edition of Ure's Dictionary (London, 1860), vol. i., p. 778, it has not been adopted by gas companies, whose first interest it would be to avail themselves of such improvements, and it is reasonable to suppose there are some insuperable objections to it. Indeed, in the last edition of Clegg's "Treatise upon the Manufacture and Use of Gas," the subject is passed by with scarcely any notice, although it had been in the previous edition treated in detail and with commendation. In the *English Gas Journal*, it is decidedly condemned. No analyses of the gas thus produced in this country have ever been published, nor any reports of photometrical experiments that might establish its light-giving capacity. As the subject for some time attracted much attention, and has given rise to extravagant expectations of cheap production of gas, it is very desirable that such trials and reports should be made by some

competent chemist. In Philadelphia, the subject has given rise to a newspaper controversy, and the publications were embodied, in 1860, in a pamphlet entitled "The Water Gas Correspondence." They contained nothing, however, to determine the real merits of the gas.

GAS FOR STEAMBOATS AND RAILROAD CARS.—Several methods have recently been put in practice of furnishing gas for the convenience of passengers in steam vessels, or upon railroads. One plan is to place in the boats or under the cars large cases of sheet iron, each one provided with a diaphragm or partition of india-rubber across its upper portion. A connection being made between the receptacle under the diaphragm and the street main, the gas fills this portion of the case and the connection is then shut off. When required for use, the gas is forced out by the pressure of air uniformly applied upon the upper surface of the india-rubber sheet by means of a meter running by clock work. This method has so far been successful; but danger is apprehended by some that atmospheric air may find its way through the flexible sheets, all of which are more or less permeable when used to separate different gaseous compounds, and that an explosive mixture may thus be introduced. By another plan of a New York company, the gas by means of force pumps is compressed into strong cylindrical gas-holders made like the boilers of steam engines. The gas is thus made to occupy a diminished space in proportion to the pressure used, that of 20 atmospheres placing 1000 cubic feet of gas in 50 feet space. In Jersey City, where this method has been applied to furnishing gas for railroad cars, the pressure employed is about 450 lbs. upon the square inch. Under this pressure the gas is conveyed through pipes to the points where the cars receive from them their supplies. The gas by its elasticity presses through the burners, and uniformity of discharge while this force is constantly diminishing is secured by a governor or regulator constructed on the principle already described.

GAS FOR FUEL.—Besides its use for producing light, gas has lately been applied to other domestic purposes for the sake of the heat it can be made to afford in burning. It was thus first used by chemists, and mechanics, as bookbinders, then applied it in suitable stoves to the heating of such tools as they required of a high temperature. After

this stoves were contrived on different plans in which various culinary operations might be conducted, and some also for warming rooms. Though it would appear to be an expensive fuel, it has been found for many purposes, in which only a certain amount of heat is required, and this for a short time, not merely exceedingly convenient, but even economical. No more need be consumed than is required to effect the desired purpose, and it is moreover applied directly to the object to be heated with little dispersion or waste of heat. But for warming rooms, it is objectionable, not only on account of its cost, but also from its vitiating the atmosphere by the large amount of the noxious gases produced by its combustion. If these are conveyed away by ventilating flues, they carry with them a considerable portion of the caloric set free. No doubt when gas is afforded at lower rates, means will be devised of applying it more advantageously to this purpose.

CHAPTER XI.

HYDROCARBON OR COAL OILS.

NOTWITHSTANDING the substitution in the cities and most of the towns of considerable size throughout the country of gas for oils, the demand for the latter has increased much faster than the supply, as is shown by the price for sperm oil being now more than three times what it was in 1843, when it brought about fifty-five cents per gallon. Besides its use for illuminating purposes, the consumption of oil is enormous for lubricating machinery. The railroads and steamboats, and the increasing numbers of large factories, demand such quantities of it that all the ordinary sources of supply were overtasked, and the whaling business formerly so prosperous in New England, has fallen off in the face of advancing prices, or been forced to gather itself in fewer centres, where by concentration of its operations the business could be conducted with the greatest economy. From many seaports of New England this business has quite disappeared, and the following changes in others are reported to have taken place between the years 1843 and 1859. In the former period New Bedford had 214 whale ships, and in 1859 the number had increased to 316. In New London, Conn., the number had increased from 45 to 56, and in Mattapoiset from 11 to 19.

In other towns the number of ships had fallen off as follows: Nantucket, to 33 from 85; Sag Harbor, to 20 from 43; Warren, R. I., to 15 from 21, etc. At Fairhaven, 46 ships were owned at both periods. The manufacture of lard oil, which of late years has been extensively carried on in the Western states, failed to meet the increasing demands, when at last attention began to be directed to the extraction of oils from the bituminous coals and shales, by processes of recent introduction in France and England. The success attained by Mr. James Young, of Glasgow, in his treatment of the "Torbane Hill mineral," or Boghead cannel of Scotland, served more than any thing else to give encouragement to this enterprise. In 1854, according to the testimony of this practical chemist, in a lawsuit in London, he was producing about 8000 gallons a week of an oil he called paraffine oil, which sold for 5s. a gallon, the sales amounting in all to about \$500,000 per annum, of which the greater portion was profit. Operations of a similar character had for some time previously been conducted upon a large scale at Autun, Department of the Saone and Loire, in France; the materials employed being highly bituminous shales, probably not essentially different from the Torbane Hill mineral, except in producing much less oil to the ton.

The first factory for making coal oil in the United States was established on Newtown Creek, Long Island, opposite New York city, and commenced operations in June, 1854. This was known as the Kerosene Oil Works, and was designed to work the Boghead cannel, or coal of similar character from the province of New Brunswick, or from the West, by the patented process of Mr. Young. In Kentucky, Ohio, Virginia, and Pennsylvania cannel coals were found of suitable qualities for this manufacture; and in 1856 the Breckenridge Coal Oil Works were in successful operation at Cloverport, on the Ohio river, in Breckenridge county, Ky. The same year a factory was built in Perry county, Ohio, by Messrs. Dillie and Robinson, and others rapidly sprung up in the vicinity of Newark, which soon became an important centre of this new business. In 1858, several large factories were built in New England, one in Boston, and one in Portland, Maine. It is doubtful whether Young was the first inventor or discoverer of this, for as we shall see, the late Baron von Reichenbach had many years before distilled some

TABLE OF THE COAL OIL WORKS OF THE UNITED STATES.

State.	Town or county.	Name of works.	No. of factories.	Daily capacity in 1860. Gallons.
Maine,	Portland.	Portland Company.	1	4000
Massachusetts,	Boston.	Downer Kerosene Co.	1	4000
"	"	Page & Co.	1	600
"	"	Suffolk Company.	1	300
"	"	Pinkham.	1	..
"	"	Peasley.	1	..
"	East Cambridge.	E. Cambridge Company.	1	800
"	New Bedford.	New Bedford Company.	1	300
Connecticut,	Hartford.	Hartford Company.	1	200
"	Stamford.	Stamford Company.	1	..
New York,	Newtown Creek, L. I.	Kerosene Oil Company.	1	4000
"	Hunter's Point, L. I.	Luther Atwood	1	2000
"	"	Carbon Company.	1	300
"	South Brooklyn.	Empire State Company.	1	300
"	"	Franklin Company.	1	500
"	Williamsburgh.	Long Island Company.	1	..
"	"	Knickerbocker Company.	1	..
"	"	Fountain Oil Co.	1	400
"	Harlem	Beloni & Co.	1	50
"	"	Excelsior Company.	1	..
Pennsylvania,	Darlington, Beaver Co.	Anderson & Co.	1	..
"	"	"	1	..
"	Kiskiminitas.	Aladdin Company.	1	..
"	"	Lucesco Company.	1	..
"	Freeport, Armstrong Co.	North American Company.	1	2000
"	New Galilee.	New Galilee.	1	..
"	Enon Valley.	Enon Valley Company.	1	..
Ohio,	E. Palestine, Columbiana Co.	Palestine Company.	1	..
"	Canfield, Mahoning Co.	Cornell & Company.	1	..
"	"	Sherwood	1	..
"	"	Phoenix	1	..
"	"	Mystic	1	..
"	"	Canfield.	1	..
"	Cleveland.	Dean.	1	..
"	Zanesville.	Brooks.	1	..
"	"	Cox.	1	..
"	Newark, Licking Co.	Great Western.	1	500
"	"	Three others.	3	..
"	Steubenville, Jefferson Co.	"	2	..
"	Coshocton Co.	"	7	..
"	Columbus, Franklin Co.	"	1	..
"	Cincinnati.	Grasselli.	1	..
"	"	Western Company.	1	..
"	"	Phoenix Company.	1	..
"	Perry Co.	Robinson & Co.	1	..
Virginia,	Kanawha region.	Falling Rock Company.	1	..
"	"	Forest Hill Company.	1	..
"	"	Greers.	1	..
"	"	Great Kanawha Company.	1	..
"	"	Staunton Company.	1	..
"	"	Atlantic Company.	1	..
"	"	Union Company.	1	..
"	"	K. C. C. M. and O. M. Company.	1	..
"	Preston Co.	Preston Company.	1	..
"	Monongalia Co.	White Bay Company.	1	..
"	Ritchie Co.	Ritchie Company.	1	..
"	Wheeling.	New York and Wheeling Company.	1	..
"	Taylor Co.	Marion Company.	1	..
Kentucky,	Maysville, Mason Co.	Union Company.	1	..
"	"	Ashland.	1	..
Kentucky,	Cloverport, Breckenridge Co.	"	1	..
"	Covington and Newport, opposite Cincinnati.	"	2	..
"	Owsley Co.	"	1	..
Missouri,	St. Louis.	"	1	..

ounces of a naphtha from pit coal, which was substantially identical with Young's; and several other chemists claim to have arrived at similar results; but Young was certainly the first to produce the oil on a commercial scale.

So rapid was the increase in the demand for this oil, that in 1860 there were nearly 80 manufactories in the United States, employing over \$3,000,000 capital, and producing oil naphthalin and paraffin to the amount of five millions of dollars annually. The coal oil manufacture had assumed at a bound, an importance, which gave it the leading place among the new manufactures of the previous decade. The production of illuminating oils exceeded in that year ten million gallons, and about five millions of gallons of the heavy lubricating oils and paraffine. The man who had predicted that within the next three years all this activity of production would cease, and another article then just coming into notice would supersede it, and attain to ten times its extent, would have been deemed little less than a mad-man. Yet this was precisely what happened.

HISTORY AND METHOD OF THE MANUFACTURE.

The possibility of extracting oil from bituminous minerals appears to have been known since the year 1694, a patent having been granted in January of that year to Martin Eele, Thomas Hancock, and William Portlock, for "a way to extract and make great quantities of pitch, tarr, and oyle out of a sort of stone, of which there is a sufficient found within our dominions of England and Wales." This stone proved to be a bituminous shale; and in 1716 it was again applied to similar use under another patent, granted to M. & T. Belton, of Shrewsbury. In the course of the eighteenth century the oily product obtained was employed to some extent as a medicine, under the name of British or petroleum oil. Though from time to time other patents were granted in England for the same process, the business never became of importance there until the successful trials were made by Mr. James Young, of Glasgow, upon the Boghead cannel already referred to. On the continent the subject was brought before the public by the researches of Baron Von Reichenbach in

1829, '30, and '31, when he discovered and separated numerous new compounds from the products of the slow distillation of bituminous substances. The compound he named eupion is the same thing as the rectified oil now known as coal oil, paraffine oil, kerosene, photogenic, pyrogenic oil, and by other local or commercial names. He appreciated its useful properties, and recommended the prosecution of further trials with the object of establishing the best mode of separating it. In France its character was understood in 1824, when a patent was granted for its manufacture; and in 1833 factories were in operation for producing it. In 1834 the method adopted by Selligie was first published, and in the specification of the patent granted to him, March 19, 1845, is a full account of the process as conducted in the works at Autun. This is still the best treatise published upon the manufacture, and notwithstanding the numerous patents which have since been issued, the improvements are limited to comparatively unimportant modifications of the apparatus. In the United States the first patent granted in this manufacture was in March, 1852, to James Young for his process, which in this country was first introduced at the kerosene oil works on Newtown Creek. The next year two patents were granted, in 1854 and 1855 one each, in 1856 six, in 1858 seven, and in 1859 twenty-two.

As mentioned in the preceding chapter, the products obtained by the distillation of bituminous substances vary according to the amount of heat employed and the manner of its application, whether sudden or gradual. Coals thrown into red hot retorts are resolved into large quantities of gas, with the production of inconsiderable quantities of oily compounds heavier in the aggregate than water, and called coal tar. They consist of a variety of hydrocarbons, as the fluids designated by the name of naphtha, the white crystalline substance called naphthaline, the very volatile fluid benzole, besides carbolic acid and a great number of other curious and interesting compounds of hydrogen and carbon. In general they contain a less proportional amount of hydrogen than the products obtained by slow distillation, the fluids are denser, and their boiling points higher.

When the bituminous substances are gradually and moderately heated in retorts, the production of gas is small, the carbon and hydrogen separating chiefly in the form of oily compounds of a greenish color, the specific gravity of which is less than water. These compounds form what is called crude coal oil, and are similar in appearance and composition to the natural petroleum, or rock oil, obtained in some places from the earth, as will be described in the next chapter. Benzole and naphthaline, products of the other method of distillation, are found, if at all, as a result of the employment of too high heat, and instead of the latter the waxy or spermaceti-like substance called paraffine is generated and is held in solution in the oils, from which it may be separated by repeated distillations, and draining off through filters and pressing out the fluid portions of the concentrated residues, at the lowest available temperatures. The oily products are divisible into a great number of distinct compounds by means of repeated distillations, each one being carefully conducted at a certain degree of temperature, and the product which comes over at this degree being kept by itself. But in the large way they are separated into only three classes, which are distinguished as the light oils for lamps, the heavy oils which are suitable for lubricating purposes, and paraffine. Sometimes a mixture of the heaviest oils and paraffine is made use of and sold for wagon grease and such purposes; and the first products which come over in the distillation are kept by themselves, and sold under the name of naphtha (or incorrectly as benzole) to be used as a solvent for the resins, caoutchouc, etc., and for removing grease spots from fabrics.

The proportions obtained from a ton of coal or shale are very variable. The Boghead cannel yields, in well-conducted operations, about 117 gallons of crude oil, from which the product of refined oil is about 60 gallons. It can be made to produce even 130 gallons of crude oil, containing a larger proportion of refined oil than the 117 gallons ordinarily obtained. The Breckenridge coal yields from 90 to 100 gallons of crude oil, and this 50 to 60 of refined oil. The Cannelton coal of Virginia is of similar quality to the Breckenridge cannel. The coals of Ohio run from 55 to 87 gallons of crude oils to the ton, and those of Darlington, Penn., from 45 to 55 gallons. Besides

the oils there also come over from the retorts, as in the gas manufacture, a quantity of water rendered alkaline by the ammonia it holds. This collects at the bottom of the reservoirs into which the products are received, and the oil that floats upon the surface being removed the ammoniacal liquors are allowed to escape.

While the general plan of the operations is the same in all the factories, the apparatus is variously modified. By Mr. Young's process the coal is distilled in cast-iron Δ -shaped retorts, like those employed in making gas, and the volatile products are passed by a worm through a refrigerator kept at a temperature of about 55° F. The oils as they condense drop from the end of the worm into a receiver. Many patents have been granted in Europe and in this country for different kinds of retorts. Some are made of cylindrical form and set upright in the furnace; the charge is introduced at the top and drawn out, when exhausted, at the bottom; the volatile products making their exit either through pipes at the top or at different heights. Some have been constructed of fire clay instead of cast iron. In order that the charge may be uniformly heated, revolving cylindrical retorts have been contrived and patented, first in France many years ago, and recently in the United States. They are sometimes eight feet long and six feet diameter, suspended upon an axle at each end. They are charged through a manhole in the front end like the common horizontal retorts, and the vapors pass out through the axle at the opposite end, which is made hollow for this purpose. Retorts of the size named are charged with about a ton of cannel coal, and four such charges may be worked off in twenty-four hours. They revolve slowly, about twice in a minute, thus turning the charge over and causing it to be uniformly exposed to the fire beneath. At the Lucesco works, thirty miles above Pittsburgh, on the Alleghany, ten large revolving retorts are stated to be in operation, each one of the capacity of two and a half tons. They are recommended for the rapidity with which the process is conducted, and the large amount of oil obtained to the ton of coal while they continue in good order; and on the other hand it is objected to them that the coal is apt to be ground to powder, and the dust is carried along with the vapors, obstructing the condensing worm and adding to the cost of purification. They are, more-

over, expensive to construct and liable to get out of order.

By all these arrangements the fire which causes the expulsion of the volatile matters is outside of the retorts. But the same object is also attained by the use of ovens and pits similar to those used for producing charcoal and coke, in which the material operated upon is itself partially consumed, to generate the heat required to drive off so much of its volatile constituents as may escape combustion. Kilns thus designed for extracting coal oils have been in use in this country and in Europe; and in Virginia, near Wheeling, the plan has been adopted of distilling the coal or shale in large pits dug in the ground of capacity sufficient to contain 100 tons of the raw material. These are covered with earth, and the fire being started at one end, the heat spreads the volatile products forward, and they are drawn out at the opposite end by the exhausting action caused by a jet of steam, and received into suitable condensing apparatus. Some of the kilns are constructed to be fired at the bottom, and the vapors then pass upward through the charge, and are conveyed in pipes from the top to the condensers. The kilns of the Kerosene Oil Company, patented by Mr. Luther Atwood, are made open at the top, and a downward draught through the charge, which is fired on the upper surface, is produced by a steam jet thrown into the eduction pipe that passes out from the bottom of the kiln. A partial vacuum is thus produced, causing a current of air to flow in from the kiln. At the works of this company there are 18 of these kilns in shape like a circular lime kiln, built of ordinary brick and lined with fire brick. They are 20 feet high and 12 feet diameter inside, each one having a capacity of over 25 tons of coal. When this amount of Boghead cannell is introduced it is covered with about four tons of Cumberland coal and a quantity of pine wood. This is set on fire, and at the same time the steam jet is let on. The heated gases from the combustibles above pass through the bituminous materials below; but little air reaches these that is not already deprived of its power of sustaining further combustion. The volatile products are gradually expelled before the slowly increasing heat, and the operation is not completed till the expiration of four days. It is hastened or checked, as may be necessary, by means of the steam jet by

which the draught is controlled. What is left in the kiln is unconsumed coal and ashes—no good coke is produced. The condensers at these works are tall cylinders of boiler-plate iron. Passing through a succession of these the vapors collect and trickle down their sides, and the mixed oily and aqueous products are received into iron vats placed in the ground. The uncondensable gases escape into the open air from the top of the last of the cylinders. From the vats the oil rising to the surface flows over into a conduit that leads to a large cistern in the ground of the capacity of 40,000 gallons. The water at the same time is discharged by a pipe, one end of which is at the bottom of the vat, and the other is bent over its upper edge, the flow being caused by the difference of an inch in the elevation of the surface of the two vats. Some oil is carried over into the second vat, and this is separated by a repetition of the same arrangement, and so on through several vats, till the ammoniacal waters are finally allowed to escape after being first received into a large cistern, where some oil still collects upon the surface, and is removed by occasional skimming.

Still another method of conducting the dry distillation is by the introduction of highly heated steam into the retorts, as patented by Mr. William Brown, in 1853, in England and in this country, though this seems also to have been used in the original operations of Selligue in France. The effect of the steam is to aid in heating the charge, while at the same time the vapors are taken up and carried along by it, and protected from being burned or decomposed by remaining in contact with the hot surfaces of the retort. In the subsequent distillation of the crude oil, high steam is similarly applied in the stills.

Nearly the same process of refining is practised at all the factories. The crude oil is pumped up into large stills of cast or boiler-plate iron, with cast-iron bottoms two inches thick. The capacity of these at the works above referred to is 1500 gallons each, and the time required for distilling off this amount of oil is 24 hours. They are heated by fires of anthracite and coke, the latter being itself a product of the distillation and obtained from the inside of the stills after each heat. It is deposited from the crude oil and forms a solid and extremely hard incrustation which is sometimes nearly a foot

thick upon the bottom of the stills. It is a much superior coke to that obtained from the gas retorts, and in its structure is coarsely honey-combed in the upper or last formed portions, gradually growing closer and more compact toward the bottom upon which it adheres. The distillation should be conducted at a temperature not exceeding 800° F., and the process may be rendered continuous by admitting a small stream of oil into the stills. The vapors passing through the goose-neck are condensed in a long worm kept in the water condenser, which should be, in the latter part of the distillation, at a temperature of 80° or more. It is necessary to guard against so low temperature as might cause the paraffine to solidify in the worm, which by stopping the flow of the products might result in blowing up the still. The heat is carefully regulated so that the oil comes over uniformly, flowing from the end of the worm in a steady stream. It is still of a greenish color, with more or less of its peculiar, disagreeable odor. Yet it is evidently purified to a considerable extent by its separation from the free carbon and other impurities, usually amounting to 10 or 12 per cent., which are left behind in the stills. The oils are next pumped into large cylindrical cisterns called agitators, to undergo the chemical treatment, which is in general the same as that practised by Selligue. An addition is made to them of a quantity of sulphuric acid, it may be to the amount of 5 per cent. The mixture is then violently agitated or made to sweep rapidly round by stirrers in the cisterns, moved by machinery. The pure oil and paraffine are unaffected by the chemical agents, but the carbonaceous particles and coloring matters are more or less charred and oxidized, and their condition is so changed that when the mixture is left for some hours to repose, they subside in great part together with the acid, and these can then be drawn off leaving the partially purified oil in the upper portion of the cisterns. This is next washed with about one fifth its quantity of water, which removes the soluble impurities and a portion of the remaining acid. These, after subsiding, being drawn off, a strong lye of potash or soda is introduced into the oil, which neutralizes and fixes what acid remains, and causes the precipitation of farther portions of the coloring and tarry matters. The mixture is again agitated and is then left six hours to repose, after which

the sediment being drawn off, it is again washed with water, and this too, with the matters it has taken up, are drawn off. In some places chalk or lime has been employed instead of the alkaline lye to neutralize and fix the acid, and the chemical treatment, as it is called, is in other respects variously modified. Though this has been designated the "cold" treatment, the temperature should not be allowed to fall below 90° during these processes.

At last the oils freed from most of their impurities are introduced into stills like those of the first set. The product which first comes over is a very light oil somewhat discolored, which is soon followed by a clear oil having little odor. This gradually increases in density from 0.733 to 0.820, up to which point the mixture of oils is classed as illuminating, and is without further preparation sufficiently pure to be at once barrelled for the market. After this the increasing depth of the color and the greater density of the product indicate that the light oils have been nearly exhausted, and the remaining portions are hence kept by themselves to afford the heavy lubricating oils, and also it may be, by means of fractional distillation, the additional quantities of light oils they still contain, and finally the paraffine which is chiefly concentrated with the last portions. This substance when separated from the oils by filtration and pressure at low temperatures, is of a dark color and somewhat offensive odor; and to bleach and deodorize it have proved to be somewhat troublesome and expensive operations. Exposure to the sunlight has a bleaching effect; but the processes for this purpose have not yet been made public. When obtained perfectly pure and white, difficulties have been encountered in running it into candles, which are not common to other materials used for this purpose. When cooled in ordinary moulds the paraffine would crack in lines radiating from the wick, and the exterior would present a clouded, mottled surface. The method of obviating this difficulty, as described in the French work, "*Le Technologiste*," of 1859, is to use a mould in two parts, that part for the point of the candle working in the other like a piston. These moulds being brought to the temperature of melted paraffine are filled and then immediately plunged into water at nearly the freezing point. Having remained 3 or 4 minutes, they are taken out and exposed to

a current of cool air for 15 or 20 minutes. The candles then come out, as the movable part of the mould is pushed in, free from defects. This method is successfully introduced into the United States. Paraffine candles have been made at some of the coal oil works, as at those of New York, New Bedford, and Portland. They are of beautiful appearance, resembling the best sperm candles, and at the same time are more economical for the amount of light they afford. The oil that is pressed out from the paraffine is useful chiefly as a lubricator, and from the low temperature at which it is obtained, if for no other reason, it is insured against chilling in cold weather. The residue in the stills, is a mixture of the tarry matters with the portion of the chemical ingredients that was introduced with the oils. For this no use is found. The heavy oils find their principal application in lubricating machinery, and large quantities are consumed for this purpose upon the Western railroads. The heavier natural oils of Ohio, when washed clean from the sand that comes up with them, are also very well adapted for this use; but it is found advantageous to mix either the crude or manufactured article with an equal quantity of lard oil. The petroleum corrects the tendency of this to gum and chill, while it receives additional body from the lard oil. Another use for the heavy oils is for cleansing wool in the woollen factories, and where they have been tried for this purpose, they have been preferred to other oils. In currying leather, also, they are said to have proved a good substitute for fish oil. Experiments have been made with them in Ohio, for mixing paints, and the crude heavier kinds, as those of Mecca, treated in the same manner as linseed oil, boiling them with dryers, etc., formed a good body, covered the wood well, dried rapidly and perfectly, and formed a smooth, hard surface, retaining no odor. The great abundance of the supply of petroleum at the West induced some speculation as to the probability of the hydrocarbon oils being used for fuel for steamboats, locomotives, and wherever a highly concentrated, portable, and manageable fuel is required. For domestic uses, also, such as require a fire only a little while at a time, the coal oils were conveniently used in suitable stoves in the same manner that gas is applied to the same purpose. But experiments are wanting to establish the rate per gallon at

which it might enter into competition with other fuels upon a larger scale. Besides the heavy and light oils, no other valuable products result from the distillation of the coal oils. Benzole is said not to be a product of this process. It belongs, together with a special class of hydrocarbons designated as the benzole series, to the tar of the gas works; and if ever obtained in the coal oil distillation, it was declared that it must be by bad management and the use of excess of heat. It was found, after the discovery and practical adoption of the petroleum as an illuminating fluid, that from this, by the refining and distilling processes, not only benzine but naphtha and other still more volatile hydrocarbons were produced, and the principal difficulty in reducing the petroleum to a safe and non-explosive illuminator was to rid it of these very volatile oils. It is probable that they did exist in nearly the same form in the coal oils but had not been skilfully eliminated at first.

The lighter coal oils were superior in many respects to most of the articles previously used for purposes of illumination. Their odor, though not very agreeable, was better than that of most of the sperm or lard oils, and the spots made by spilling them on articles of dress or furniture were removed with less difficulty than those of the fatty oils. They were also far less liable to explosion than the so-called "burning fluids," which were previously in very general use, but were constantly producing terrible accidents and loss of life. They were, if burned in properly-constructed lamps, much less disagreeable and liable to smoke than camphene.

But the reign of the coal oils for purposes of illumination was destined to be of short duration; for petroleum, or as it came to be called when refined for illuminating purposes, "kerosene oil," became so abundant in 1861 and 1862, and received such an extensive development, that the distillation of oil from coals, both for illuminating and lubricating purposes almost ceased after 1863. An effort was, indeed, made in 1863 and 1864 to distil these oils on a large scale from the bituminous shales of Kentucky; but though the material could be had at the cost of breaking it up, and the process of distillation was very simple, the flowing wells of Western Pennsylvania, and West Virginia, furnished crude petroleum so cheaply that this undertaking proved unprofitable.



CHAPTER XII.

PETROLEUM, OR ROCK OIL.

THE occurrence of an oily fluid oozing in some regions from the surface of the earth, coming out with the springs of water, and forming a layer upon its surface, has been noticed from ancient times, and the oil has been collected by excavating pits and canals, and also by sinking deep wells. Bakoo, a town on the west side of the Caspian Sea in Georgia, has long been celebrated for its springs of a very pure variety of petroleum or naphtha, and the annual value of this product, according to M. Abich, is about 3,000,000 francs, and might easily be made as large again. Over a tract about 25 miles long and half a mile wide, the strata, which are chiefly argillaceous sandstones of loose texture, belonging to the medial tertiary formation, are saturated with the oil, and hold it like a sponge. To collect it large open wells are sunk to the depth of 16 to 20 feet, and in these the oil gathers and is occasionally taken out. That obtained near the centre of the tract is clear, slightly yellow, like Sauterne wine, and as pure as distilled oil. Toward the margins of the tract the oil is more colored, first a yellowish green, then reddish brown. In the environs of Bakoo are hills of volcanic rocks through which bituminous springs flow out. Jets of carburetted hydrogen are common in the district, and salt, which is almost always found with petroleum springs, abounds in the neighborhood.

Another famous locality of natural oils is in Burmah, on the banks of the Irrawaddy,

near Prome. Fifty years ago it was reported there were about 520 wells in this region, and the oil from them was used for the supply of the whole empire and many parts of India. The town of Rainanghong is the centre of the oil district, and its inhabitants are chiefly employed in manufacturing earthen jars for the oil, immense numbers of which are stacked in pyramids outside the town, like shot in an arsenal. The formation containing the oil consists of sandy clays resting on sandstones and slates. The lowest bed reached by the open wells, which are sometimes 60 feet deep, is a pale blue argillaceous slate. Under this is said to be coal (tertiary?) The oil drips from the slates into the wells, and is collected as at Bakoo. The annual product is variously stated at 412,000 hogsheads, and at 8,000,000 pounds.

The Burmese petroleum has recently been imported into Great Britain, and is employed at the great candle manufactory of Messrs. Price & Co., at Belmont and Sherwood. It is described as a semi-fluid naphtha, about the consistence of goose grease, of a greenish brown color, and a peculiar, but not disagreeable odor. It is used by the natives, in the condition in which they obtain it, as a lamp-fuel, as a preservative of timber against insects, and as a medicine. It is imported in hermetically closed metallic tanks, to prevent the loss of any of its constituents by evaporation. At the works it is distilled first with steam under ordinary pressure, and then by steam at successively increasing temperatures, with the following results:—

Temperature. Fabr.	Proportional product.	Character of product.
Below 212°	11	Mixture of fluid hydrocarbons free from paraffine.
230° to 293°	10	“ “ containing a little paraffine.
293° to 320°	..	Distillate very small in quantity.
320° to 612°	20	Containing paraffine, but still fluid at 32°.
About 612°	31	Product which solidifies on cooling, and may be submitted to pressure.
Above 612°	{ 21	Fluids with much paraffine.
	{ 3	Pitchy matters.
	{ 4	Residue of coke, and a little earthy matter in the still.

Nearly all the paraffine may be separated from the distillates by exposing these to freezing mixtures; and the total product of this solid hydrocarbon is estimated at 10 or 11 per cent.

Many other localities might be named which furnish the natural oils upon a less extensive scale, as in Italy, France, and Switzerland. In Cuba impure varieties of bitu-

men are met with flowing up through fissures in the rocks and spreading over the surface in a tarry incrustation, which sometimes solidifies on cooling. In the island of Trinidad, three fourths of a mile back from the coast, is a lake called the Tar Lake, a mile and a half in circumference, apparently filled with impure petroleum and asphaltum. The latter, more or less charged in its numerous

cavities with liquid bitumen, forms a solid crust around the margin of the lake, and in the centre the materials appear to be in a liquid boiling condition. The varieties contain more or less oil, and methods have been devised of extracting this; but the chief useful application of the material seems to be for coating the timbers of ships to protect them from decay. By the patented process of Messrs. Atwood of New York, the crude tar of this locality having been twice subjected to distillation, and treated with sulphuric acid and afterward with an alkali, as in the method of purifying the coal oils, is then further purified by the use of permanganate of soda or of potash. Being again distilled it yields an oil of specific gravity 0.900, which is fluid at 32° F., and boils at 600° F.

In the United States the existence of petroleum has long been known, and the article has been collected and sold for medicinal purposes; chiefly for an external application, though sometimes administered internally. It was formerly procured by the Seneca Indians in western New York and Pennsylvania, and was hence known as Seneca or Genesee oil. At various places it was recognized along a belt of country passing from this portion of New York across the north-west part of Pennsylvania into Ohio. In the last-named state it was obtained in such quantity in the year 1819, by means of wells sunk for salt water, that it is a little remarkable the value of the material was not then appreciated, and the means perceived of obtaining it to any amount. The following description of the operations connected with the salt borings then in progress on the Little Muskingum, in the south-western part of the state, written in 1819, was first published in the *American Journal of Science* in 1826: "They have sunk two wells which are now more than 400 feet in depth; one of them affords a very strong and pure water, but not in great quantity. The other discharges such vast quantities of petroleum, or as it is vulgarly called, 'Seneca oil,' and besides is subject to such tremendous explosions of gas, as to force out all the water and afford nothing but gas for several days, that they make but little or no salt. Nevertheless, the petroleum affords considerable profit, and is beginning to be in demand for lamps in workshops and manufactories. It affords a clear bright light, when burnt in this way, and will be a valuable article for

lighting the street lamps in the future cities of Ohio." Several coal-beds were penetrated in sinking these wells.

In north-western Pennsylvania the existence of oil in the soil along the valleys of some of the streams was known to the early settlers. One stream, in consequence of its appearance in the banks, was called Oil Creek. In other localities also it was noticed, and similar occurrences of oil were observed at some places in western Virginia and eastern Kentucky. At Tarentum above Pittsburg, oil was obtained by boring about the year 1845. Two springs were opened in boring for salt, and they have continued to yield small quantities of oil, sometimes a barrel a day. This has been used only for medicinal purposes. On Oil Creek two localities were especially noted, one close to the northern line of Venango county, half a mile below the village of Titusville, and one 14 miles further down the stream, a mile above its entrance into the Alleghany river. All the way below the upper locality through the narrow valley of the creek are ancient pits covering acres of ground, once dug and used for collecting oil after the method now practised in Asia. Cleared from the mud and rubbish with which they are mostly filled, some of them are found to be supported at the sides with logs notched at the ends as if done by whites, and it has been supposed by some that this is the work of the French who occupied that region the first half of the last century. Others think the Indians dug the pits, and in proof of this they cite the account given by Day, in his "History of Pennsylvania," of the use of the oil by the Seneca Indians as an unguent and in their religious worship. They mixed with it their paint with which they anointed themselves for war; and on occasions of their most important assemblages, as was graphically described by the commandant of Fort Duquesne in a letter to General Montcalm, they set fire to the seum of oil which had collected on the surface of the water, and at sight of the flames gave forth triumphant shouts which made the hills re-echo again. In this ceremony the commandant thought he saw revived the ancient fire worship, such as was once practised in Bakoo, the sacred city of the Guebres or Fire Worshipers.

The old maps of this portion of Pennsylvania indicate several places in Venango and Crawford counties where oil springs had been noted by the early settlers. They made some

use of the oil, collecting it by spreading a woollen cloth upon the pools of water below the springs, and when the cloth was saturated with the oil wringing it out into vessels. The two springs referred to on Oil Creek furnished small quantities of oil as it was required, and from a third, twelve miles below Titusville in the middle of the creek, the owner has procured 20 barrels or more of oil in a year.* In 1854 Messrs Eveleth and Bissell of New York purchased the upper spring, and leased mineral rights over a portion of the valley. They then obtained from Prof. B. Silliman, jr., of New Haven a report upon the qualities of the oil, and in 1855 organized a company in New York called the "Pennsylvania Rock Oil Company," to engage in its exploration. The same year a new company under the same name, formed in New Haven and organized under the laws of Connecticut, succeeded to the rights of the old company; but for two years they made no progress in developing the resources of the property they had acquired. In December, 1857, they concluded an agreement with Messrs. Bowditch and Drake of New Haven to undertake the search for oil. To the enterprise of Col. E. L. Drake, who removed to Titusville and prosecuted the business in the face of serious obstacles, the region is indebted for the important results which followed. After a well had been sunk and curbed near the spring, ten feet square and sixteen feet deep, boring was commenced in the spring of 1859, and on the 26th of August, at the depth of seventy-one feet, the drill suddenly sank four inches, and when taken out the oil rose within five inches of the surface. At first a small pump threw up about 400 gallons daily. By introducing a larger one the flow was increased to 1000 gallons in the same time. Though the pumping was continued by steam power for months no diminution was experienced in the flow. The success of this enterprise produced great excitement, and the lands upon the creek were soon leased to parties, who undertook to bore for oil for a certain share of the product, sometimes advancing besides a moderate sum to the owner.

The country was overrun by explorers for favorable sites for new wells, and borings were undertaken along the valley of the Al-

leghany river, and up the French Creek above Franklin. The summer of 1860 witnessed unwonted activity and enterprise in this hitherto quiet portion of the state, where the population had before known no other pursuits than farming and lumbering. Every farm along the deep, narrow valleys, suddenly acquired an extraordinary value, and in the vicinity of the most successful wells villages sprang up as in California during the gold excitement, and new branches of manufacture were all at once introduced for supplying to the oil men the barrels required for the oil and the tools employed in boring the wells. From Titusville to the mouth of Oil Creek, about 15 miles, the derricks of the well borers were everywhere seen. On the Alleghany river the number below Tidioute in Warren county, south into Venango county, showed that this portion of the district was especially productive, and the same might be said of the vicinity of the town of Franklin, both up the Alleghany river and French Creek. The wells had amounted to several hundred, or according to one published statement, to full 2000 in number before the close of the year, and from an estimate published in the *Venango Spectator*, (Franklin) 74 of these on the 21st of November were producing the following daily yield:—

	No. of wells.	Prod. bbls.
On Oil Creek,.....	33	485
" Upper Alleghany river, 20	.....	442
Franklin,.....	15	139
Two Mile Run,.....	3	64
French Creek,.....	3	35
Total,.....	74	1165

The capacity of the barrel is 40 gallons, and at the low estimate of only 20 cents the gallon the total value of the daily product is not far from \$10,000. The depth of the wells is in a few instances less than 100 feet. The shallowest one reported, belonging to the Tidioute Island Oil Company, was 67 feet deep, and its product was 30 barrels a day. In general the depth is from 180 to 280 feet; one well in Franklin is 502 feet in depth, and one on Oil Creek 425 feet. The deepest wells are not the most productive, and the fact of their being extended beyond the ordinary depths may generally be considered an evidence of their failure to produce much oil. There are exceptions, however, to this, one of the deepest wells, that of Hoover and Stewart, three miles below Franklin, producing largely of excellent oil.

* See a pamphlet by Thomas A. Gale, published in Erie, Penn., 1860, entitled "Rock Oil in Pennsylvania and elsewhere."

The selection of localities for boring is very much a matter of chance. Proximity to productive wells is the first desideratum; but this, when attainable, is not always attended with success. The oil does not appear to be spread out, as the rocks lie in horizontal sheets, or if so there are many places where it does not find its way between the strata, and wells near together from which oil is pumped do not always draw upon each other. No doubt the system of crevices and pervious strata through which the oil flows in its subterranean currents, is very irregular and interrupted. The valleys to which the operations are limited are narrow, and are bounded on each side by hills, the summits of which, from 250 to 400 feet above the bottoms, are on the general level of the country. The increased expense that would be incurred in sinking from the upper surface and in afterward raising the oil to this height, as also the uncertainty of finding oil elsewhere than in the valleys, have so far prevented the explorations being extended beyond the creek and river bottoms; but it cannot be long before the capacity of the broad districts between the streams to produce oil is thoroughly tested. At present the most favorable sites are supposed to be near a break in the hills that form the margin of the valley, as where a branch comes into the main stream. An experiment is already undertaken to test the high grounds west of Tidioute branch.

As the bituminous coals are known as a source of hydrocarbon oils, it is natural to suppose that the springs of oil found near the coal region are fed from the coal beds or bituminous shales of the coal formation. But it happens that only a few oil springs of western Pennsylvania have been struck in the coal-measures themselves, and that some of these are sunk into the underlying groups of rock to reach the supplies of oil. The oil districts are in general outside of the coal-field and upon the outcrop of lower formations which pass beneath the coal-measures, the whole having a general conformity of dip. Hence the slope of the strata is toward the coal, and an obstacle is thus presented to the flow of the oil from the coal-field toward its margin; and though under some circumstances the elastic pressure of the carburetted hydrogen gas might force the oil considerable distances from its source, it is hardly to be supposed that this should first find its way down into lower formations

and then be carried many miles (30 to 50) and find its outlet in another district, rather than to the surface at some nearer point. The strata of north-western Pennsylvania lie nearly horizontally, their general inclination being toward the south. The highest rock upon the summits of the hills of the oil region is the conglomerate or pebbly rock (the floor of the coal-measures). Beneath this are series of thin bedded sandstones, slates, and shales, alternating with each other with frequent repetitions. The shales, often of an olive green color, are readily recognized as belonging to the Chemung and Portage groups of the New York geologists—a formation which overspreads this portion of the country, extending in New York two thirds of the way toward Lake Ontario and as far east as Binghamton. It is also continued through Ohio, crossing the Ohio river at Portsmouth, and in this state is known as the Waverley series. Under this is a heavy bed of bituminous shale, 200 or 300 feet thick, called in Ohio the black slate and in New York the Hamilton shales. This group contains an immense amount of carbonaceous matter, and oil is often disseminated through it. Sometimes it runs out in springs and finds an outlet by the occasional fissures in the beds. Dr. J. S. Newberry, who has given much attention to this subject, is of opinion that this formation contains sufficient carbonaceous material to be the source of the oil, and that the more porous and open shales and sandstones of higher formations are its reservoirs. Such is the geological formation of the Seneca oil region and of the oil springs of Canada West, which are the districts affording this product most remote from the coal-field. But from whatever source the oil may be derived, its origin is at the best very obscure, and little light can be thrown upon the probability of the supply long enduring the heavy drain made upon it by hundreds of wells worked by powerful steam pumps. But though actual experience alone must determine the extent of the quantities of oil stored up and the period they will last, there is certainly encouragement to be drawn from the never-failing yield of the oil districts of Asia, which for centuries have poured forth without stint their rivers of oil.

The sinking of wells is conducted after the usual method of boring artesian wells. After much uncertain consideration of the chances, a particular spot is selected, more,

perhaps, from the hope of its being the right one than from any very practical grounds for the choice; but as the oil flows only in crevices among the strata, the location is frequently determined—other things being equal—by the prospect of reaching the rock at a few feet from the surface, and thereby avoiding the necessity of sinking an open well or driving pipes through unknown obstacles down to the rock. If the bed rock is found within ten or fifteen feet, the boring is begun at once. The derrick being raised, an elm, hickory, hemlock, or other elastic timber is cut down, some 25 or 30 feet in length. The larger end is fixed in a notch of a tree, or heavy post planted in the ground, and another post is set under it at a distance from the but determined by the elasticity of the timber. The spring of the pole should be sufficient to raise the drill quickly, with its iron connecting rods, weighing often 300 pounds. The rods are suspended from the free end of the pole by a swivel or simple bolt-head, turning freely around. At the commencement of the boring, the rods being very short do not weigh more, including the drill, than 70 or 80 pounds. Two men, therefore, jerk them forcibly down, to increase the momentum of the drill; the spring of the pole immediately raises the drill for the next stroke, while at each blow a man gives it a slight turn so that it may cut a round hole. Several other methods are employed for making the pole spring; by one, which is conveniently worked without employing steam or horse power, a sort of double stirrup is suspended from the pole into which two men place each a foot, and pressing the stirrup suddenly down it immediately springs up again with the drill. This is much used, though some wells are sunk by horse-power machinery, and some by steam engines of four or five horse power.

As the well is constantly deepening, while the stroke of the spring-pole (about 30 inches) remains constant, a vertical adjusting screw about 18 inches in length is attached to the end of the spring-pole; the rope is clamped to the lower end or nut of this screw, and then extended to the pulley above. As the well deepens, a slight turn of the screw lowers the rope with the rods attached to it, and thus keeps the drill always free to fall to the bottom with an equal stroke. The work is continued, by a constant succession of strokes, to a depth of about fifty feet, successive lengths of iron rods being screw-

ed on as the hole deepens—increasing the weight of the tools to about 300 pounds. The use of any additional rods is then dispensed with, and the upper rod is suspended by a rope attached to the spring-pole, and continued above the pole around a pulley and windlass, used to raise the boring tools when it is necessary to draw them out. They are drawn up in this manner at intervals of an hour or two, in order to sharpen and temper the drill, and to make room for the sand pump. This is a thin iron tube, a little more than half the diameter of the hole, with a simple valve at the bottom opening upward. It is lowered by a cord to the bottom of the well, then raised up with a jerk, and suffered to drop again by its own weight. This is repeated quickly eight or ten times; a whirl is thus produced in the water below which stirs up the mud and small pieces of broken stone; as the tube drops, the mud and small stones enter the open valve and are retained when the tube is drawn out.

The jarrers are employed to increase the force of the spring-pole when the drill happens to be wedged in the hole by broken pieces of stone or by other obstructions. They are two rectangular links about 18 inches in length, formed of stout bars of iron, and connecting the upper rods with the lower. When the drill descends to the bottom, the upper link, as it descends, slips down eight or ten inches in the lower link, and when the pole springs up the upper link has the advantage of moving through this space, and thereby giving a sudden upward jerk to the drill rod. The force of this upward jerk is greatly increased by a heavy rod introduced above the upper link, and which, as it moves up, lends its momentum to the stroke.

The hole is carried down by three men at different rates according to the nature of the strata encountered, varying from a foot or less to six feet in a day. In the hard sandstones of quartz pebbles firmly united together, two or three inches sinking in 12 hours may be all the progress practicable. The material brought up is carefully scanned for any oily appearance indicating the proximity of oil, and the well is watched to observe if any carburetted hydrogen gas escapes from it, which is considered a favorable sign.

The process of drilling in the rock is considered by all concerned in boring for petroleum, a very simple and even welcome operation, especially when contrasted with the

uncertainties and apprehensions that surround the driving of pipes. At the outset, the cost of four iron pipes and bands long enough to reach a depth of forty feet, is equal to that of a complete set of boring tools with the rods and ropes sufficient to bore half a dozen wells of 300 feet each in depth. There is often great uncertainty of knowing how deep the pipes will have to be driven, and it is impossible to foresee the various obstacles through which they have to go. When the work has gone down successfully 70 or even 100 feet, the lowest pipe is often suddenly broken or takes an oblique direction. The pipes in the ground are then abandoned, and a new set driven in another place, although in several instances pipes reaching 60 feet in depth have been pulled up by a lever and axle, with chains or rods attached to a lewis wedge driven into the bottom pipe.

The pipes are of cast iron, generally ten or twelve feet long, about five inches bore, and the shell full an inch thick. The lower end of the first pipe is not sharpened, but is driven down blunt as it comes from the mould. The pipes are fastened together in the simplest manner possible, by wrought-iron bands, the ends being turned off, leaving a neck somewhat larger than the interior diameter of the bands, to receive them when expanded by heat.

Through common earth or gravel the pipes are forced down by the ordinary process of pile-driving; but when large stones are encountered, or round boulders as large as a man's head, there is great risk of breaking or turning the pipes. As soon, therefore, as the pipes meet with any great resistance the driving is suspended and the drill is applied to break up the stone or to bore a circular hole in it, which is afterward reamed out as large as the interior diameter of the pipes. The driving is then resumed, and in soft shales the pipes are often forced on, crushing down the sides of the hole, and making their way through to the depth of 12 or 15 inches in the rocky stratum.

The cost of boring a well 200 feet deep is generally estimated at from \$1000 to \$1500. The latter sum includes the cost of all the tools and materials, and also of a small steam engine, a large tank of pine plank, in which the product is collected for the oil and water to separate, and it also allows for such accidents and delays as are common to these operations.

When the oil is struck it often rises up in the well, sometimes flowing over the top, and in several instances it has burst forth in a jet and played like a fountain, throwing the oil mixed with water high up into the air. Such jets have rarely lasted long, and are usually interrupted by discharges of gas, the elasticity of which drives out with violence the fluids mixed with it, as champagne wine is projected from a bottle on removing the cork. Hundreds of barrels of oil have, however, been wasted at some of the wells for want of means to collect it or stop its flow in its sudden first appearance. At Williams' well, half a mile below Titusville, about 100 barrels of oil were collected the first night the oil was reached, and a large quantity besides was lost. A similar event occurred near Tidioute, the oil rushing up so violently as to knock over the laborer who held the drill and to pass through the derrick and over the trees around. After a time the spouting wells become quiet and the oil settles down, so that it has to be raised by pumping. The pumps are contrived to work at any depth, and by men, or by horse power, or the steam engine. For a time at some of the wells the product has been water alone or water mixed with a little oil; and after pumping several days this has given place to oil with a moderate proportion of water. If the pumping be suspended for a day water accumulates, and it may be several days before this is drawn out and the former yield of oil recovered. The water is generally salt. The flow of oil has rarely if ever been known to fail entirely except by reason of some obstruction in the wells, and in such cases it has usually returned after the hole has been bored out larger or made deeper. The supply is not, however, altogether regular in any of the wells, even after the flow has settled down to a moderate production of 10 or 15 barrels a day. The maximum yield of a well for a considerable time is about 50 barrels a day, and from this the production ranges down to 4 barrels, below which it is considered insufficient to pay expenses.

The oil and water are conducted from the pumps into the large receiving vats, and after the water has subsided the oil is barrelled for the market. From the upper Oil Creek it is mostly wagoned to the Union Mills station in Erie county, on the Erie and Sunbury railroad; and from Tidioute to Irvine, at the mouth of the Broken Straw, on the same road. But most of the oil along

the Alleghany river and French Creek is taken by steamboats down the river to Pittsburgh. New York city is at present the principal market, but the country refineries are already taking a considerable share of the oil.

The product of the different wells varies somewhat in quality and value. At Franklin the oil for the most part is heavy, marking as low as 33° Baumé, which corresponds to specific gravity 0.864. Some of the wells furnish oils of 35° or 36°—on Oil Creek the range is from 38° to 46°, at Tidioute 43°. The French Creek oils are heavy. It is not unlikely that the depth of the wells may have some effect upon the quality of the oil, as from very shallow wells those of the lighter varieties must be likely to escape by evaporation, leaving the heavier portions behind. The oils obtained at Mecca, Trumbull county, Ohio, are heavy oils, being thick like goose grease and marking 26° or 27°, which is equivalent to specific gravity 0.900. At Grafton, Lorain county, Ohio, the oil is even darker and thicker than this, marking about 25° B.

With the exception of some light, clear oils of reddish color, the petroleum is usually of a greenish hue, more or less deep and opaque. It has an offensive smell which is not entirely removed by the ordinary methods of deodorizing practised in the refineries. The process of purification is similar to that of the coal oil manufacture, as already described. The proportion of light oils separated by distillation varies with the crude petroleum employed. The largest product is about 90 per cent., and from this less amounts are obtained down to about 50 per cent. The properties and uses of these products have already been considered in treating of coal oil.

To complete this account of the petroleum of the United States more particular mention should be made of the extension of the district from north-western Pennsylvania into New York on one side, and Ohio on the other. In Chautauqua, Cattaraugus, and Allegany counties, N. Y., are many places where the appearance of small quantities of oil upon the surface, and the escape of jets of carburetted hydrogen, indicate the existence of petroleum below; and the names of Olean and another Oil creek, a branch of the Genesee river, suggest the probability of this proving another oil district. About a mile north-west from Cuba in Allegany county, is a pool about 20 feet across and 10 feet

deep that has always been called an oil spring, its surface being covered with a coating of oil from which supplies have been obtained for medicinal purposes. A pipe was sunk into this, and on the 3d of January, 1861, when it had been driven down 20 or 30 feet, oil mixed with water suddenly gushed up with great force. Oil also appeared on the water drawn up from an artesian well sunk to the depth of 130 feet in the same vicinity. Arrangements are now in progress for thoroughly testing the capacity of this district.

In Ohio the oil-producing counties are Noble, Adams, Franklin, Medina, Lorain, Cuyahoga, Trumbull, Mahoning, and some others. Near Cleveland and in the valley of the Cuyahoga oil appears in many places, but it has not yet proved of much importance. The vicinity of Mecca, Trumbull county, is the most productive locality. Operations were commenced there in February, 1860, and in November it was stated that between 600 and 700 wells had been sunk, and 75 steam engines were in operation pumping oil. Two of the wells were yielding from 50 to 100 barrels a day each. This statement is probably much exaggerated, and while others report that several hundred wells have been sunk, a dozen or more are said to be working profitably. These wells pass through the same formation as those near Titusville, but for the most part they are shallow, ranging in depth from 30 to 100 feet, and the most of them not much exceeding 50 feet. About 30 miles south-east from Mecca, at Lowellville, Mahoning county, a well was sunk 157 feet which proved very successful, yielding 20 barrels of oil a day. This well was commenced in the conglomerate and ended in the Chemung strata. Duck Creek, Noble county, was formerly noted for the oil which appeared with the brine of the salt wells.

In Ritchie and Wirt counties, Virginia, near the Ohio river, some wells are producing oil, and this promises to be an important oil district. Canada West also contains an oil region, extending from London toward the St. Clair river, from which petroleum has been obtained the last twelve years. On the southern coast of California petroleum is said to be found in considerable quantities; and springs of it are described by Captain Stansbury in the report of his expedition, in 1849, as occurring about 83 miles east from Salt Lake City, Utah, in the vicinity of sulphur springs and beds of bituminous coal.

The fortunes made from these oil wells in Pennsylvania, West Virginia, Ohio, and Canada, in 1860, 1861, and 1862, gave rise to the wildest speculation, and the petroleum fever which set the whole country mad, for three or four years, deserves to be classed with the *Morus Multicaulis* speculation of 1836-7, the Washoe Mining Mania of 1857, or the Tulip-mania, and the South Sea Bubble of John Law, in the last century. There was, indeed, a more solid substratum of fact on which to base the petroleum speculation, the oil was found in great quantities and over a wide extent of territory, and there was a large demand for it, both at home and abroad; but only a small proportion of the eleven hundred companies, which were formed between 1861 and 1865, with their six hundred millions of dollars of nominal capital and actual paid-up capital of, perhaps, 105 millions, either owned or leased lands or oil wells. The crafty schemers who had raised the commotion and excitement, preferred to make their money by the sale of stock, and if the proposed wells were to be bored, to let their successors undertake their development. The whole community, meantime, had become infatuated; it was difficult to find a man or woman in the city or country who had not taken at least a small venture in what seemed a royal road to fortune, while in reality the chance of ever getting their money back was not one in a hundred. Grave clergymen, eminent lawyers, learned doctors, shrewd bankers, literary and scientific men of the highest character, and with them merchants, tradesmen, mechanics, farmers, and day-laborers, all purchased shares, and, in many instances, invested the little savings reserved for old age, or disaster in these very attractive certificates of stock. Counting up their prospective wealth, as prophesied in the glowing circulars of each new company, men who had never been worth a thousand dollars fancied themselves millionaires, and looked forward to the time when they should set up their carriage, and live in princely style. It was much that the bursting of this bubble did not involve the whole country in financial disaster; but it was really on so sound a basis that the great losses which followed, in 1866 and 1867, were borne without any serious panic.

It was worthy of notice, that during the height of this speculative fever, the production of the oil so far from increasing as would naturally have been expected actually dimin-

ished, and it was only after the oil had touched its lowest price that the increased and production has continued to do so from that time to the present. For several years the heavy internal revenue tax greatly discouraged production, and the markets were glutted with the commodity so that prices ruled low; but the export demand has, for several years past, steadily increased, while the home markets have each year absorbed a larger quantity.

The following table shows the rapid growth of the export trade in petroleum; and reckoning on the assumption, which the most extensive dealers assure is the true one, that not more than forty-seven per cent. of the annual production is exported, exhibits also an approximate estimate of the annual product:

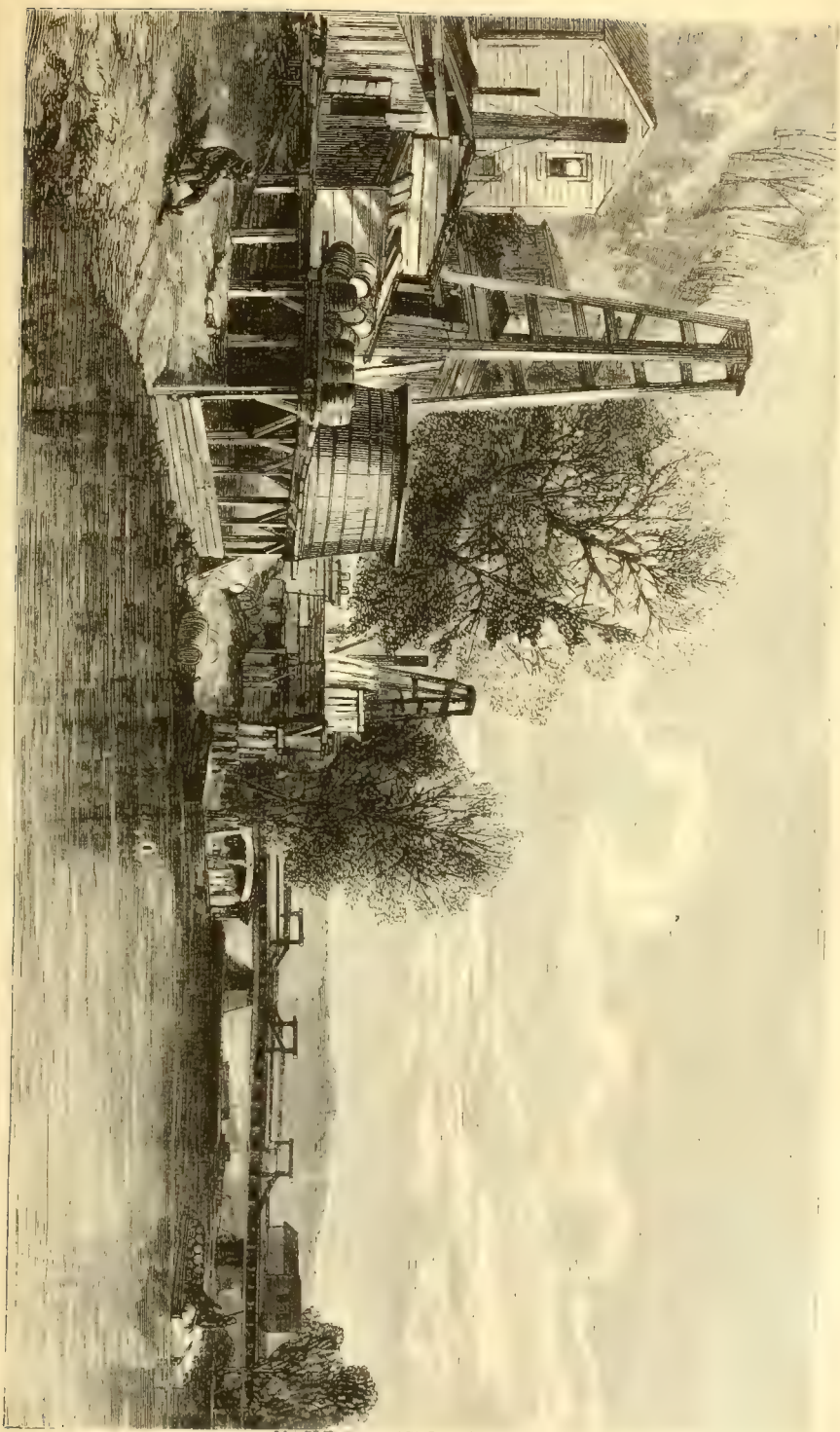
Exports and estimated production of petroleum from 1862 to 1871.

Year.	Gallons of petroleum exported.	Value of export.	Estimated gallons produced.	Estimated value of product.
1862	10,337,701	\$1,539,027	21,337,433	\$3,270,432
1863	24,250,721	5,227,839	60,265,532	11,199,157
1864	31,872,972	10,782,619	67,730,065	22,913,214
1865	29,072,018	16,534,413	61,778,038	31,107,472
1866	.....	24,830,887	.....	52,765,635
1867	.....	24,407,642	.....	51,836,458
1868	99,844,316	21,810,616	212,199,171	46,347,686
1869	97,924,545	30,625,446	208,609,653	65,079,076
1870	138,325,819	32,101,485	230,192,335	68,215,655
Seven months, June 1870 to Jan. 1871.	96,942,343	23,511,812	206,002,478	50,600,100

Here, then, is an item of production, now exported to the extent of nearly 35 millions of dollars a year, and sold to the annual amount of 70 millions, which was not ten years ago, produced to the extent of \$100,000; yet this extraordinary development has only, to a very slight extent, supplanted the trade in other means of illumination and lubrication. The consumption of Olefant gas has, as we have seen, greatly increased in the same decade; whale oil, sperm oil, and lard oil, have somewhat declined.

It could not, of course, have been otherwise than that a new business of such extent should have prompted a great amount of speculation. The aggregate losses by the formation of petroleum companies probably exceeded 125 millions of dollars. For several years the fluctuations in the price of crude and refined petroleum were very great and very rapid; but speculation having ceased it has now settled down to a scale of prices which pay a fair but not exorbitant profit on

OIL WELLS OF PENNSYLVANIA.



LAND SETTLEMENT—INTERNAL TRADE.

CHAPTER I.

WESTERN SETTLEMENT AND TRADE.

PURCHASE OF LOUISIANA—POPULATION AND LAND SALES—AVENUES TO THE VALLEY—CANAL AND RAILROAD EXPENDITURES—LAKE CITIES AND TRADE—RECIPROCITY.

THE original colonies, settled as they were under different grants, circumstances, and powers, had many and conflicting claims to the then comparatively unknown land running back to the Mississippi river, bounded on the north by the chain of lakes, and on the south by the Spanish territories of Florida and Louisiana, when there was a question of union into a confederacy. These various claims were a matter of dispute, which, from being serious, was settled by a mutual cession of the lands to the federal government, in trust, for the common benefit of all the states then existing, or thereafter to become members of the Union. The federal government having thus become owner of the lands, the constitution conferred upon Congress the power "to dispose of and make all needful rules and regulations respecting the territory and other property belonging to the United States." The obvious policy of the government, like that of every other thrifty owner, was at once to attract settlers to these lands, thereby making them serviceable to the whole people as fast as possible. To do so, the lands were to be sold cheap, and as few formalities as possible placed in the way of the settlers. The domain was organized under the control of the Secretary of the Treasury, being administered under him by a commissioner of the land office. The whole domain is divided into districts, for each of which there is a surveyor general, under whom the territory is subdivided for survey into districts. For each district there is a land office, occupied by a register and a receiver. A plan is prepared of each district by the surveyors, with the utmost care, showing

ranges, sections, and townships, with topographic characteristics. Of this plan there are three copies; one is retained at the land office, one by the surveyor, and the third is sent to the general office at Washington, where it serves to regulate all transactions. The land being all surveyed into sections of 640 acres each, is offered for sale by the government at auction, at a *minimum* price of \$1.25 per acre. After the land has been on sale two weeks, it may be sold in 40 acre lots, at a less price. The actual occupant of any land offered has the pre-emption to it. The buyer of the land pays the money to the receiver, and gets for it a receipt, of which the register sends a duplicate, with a certificate of the sale, to Washington. On the verification of the sale there, the deed of the land, called a "patent," is made out, and sent to the local land office register, who gives it to the purchaser in exchange for the receipt he holds, and his title is then complete. In addition to the attractions of low prices and pre-emption rights, long credits were originally given, to enable the settler to pay for the land out of its proceeds. But these speedily led to abuses, and the cash plan was finally adopted. There have been, however, large grants of land for military purposes, to schools and universities, to states for internal improvements, for seats of government, public buildings, benefit of Indians, salines, swamp lands, and lastly, in aid of canals and railroads—the construction of which aided the settlement of those lands at a distance from large water courses, and therefore from markets. Some time elapsed before the organization of the department was effected, and the first land office was opened in 1800, at Chillicothe, Ohio. The first sales of land, however, took place in New York three years before, and in that year a triangle on the lake was sold to Pennsylvania, in order to give her a port on the lake. That port is Erie, and is famous for the building

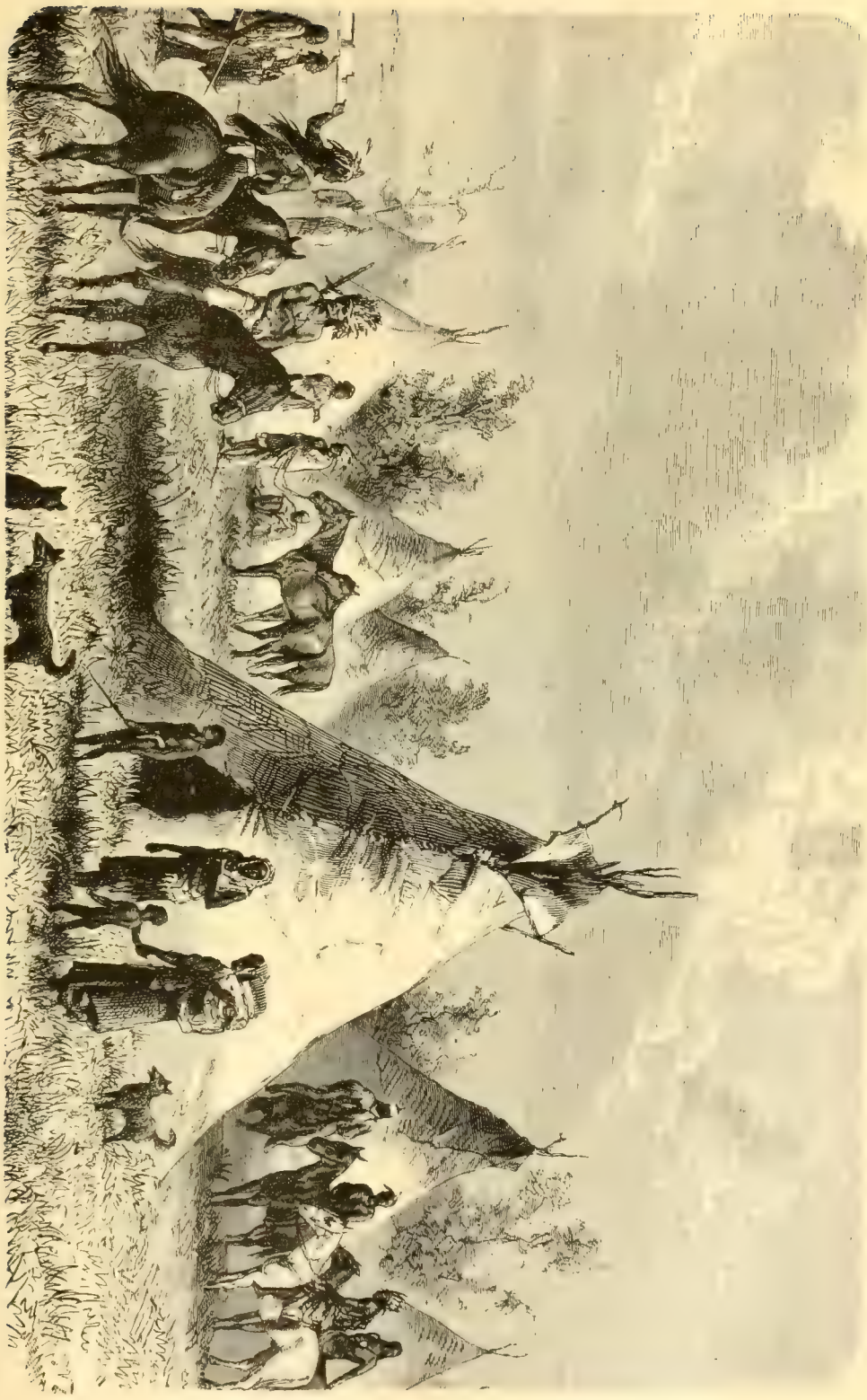
of Perry's fleet there in 1812, in seventy days from the time the wood stood in the forest until the stars and stripes floated to the breeze of the lake from the mast-head. That fleet was fatal to British supremacy on the lakes. Almost all the land sales took place in Ohio, until 1807, when offices were opened in Indiana and Mississippi. In 1809 an office was opened in Alabama, and in 1814 one in Illinois; in 1818 in Missouri, Louisiana, and Michigan. The sales of the lands proceeded with great activity in most of these states up to 1821, particularly after the embargo and war had turned attention from commerce and navigation to agriculture and manufacture. Nearly all the lands of the government were then in the great valley of the Mississippi. This is a vast basin, the sides of which are the eastern slopes of the Rocky Mountains on the west, and the western slopes of the Alleghany Mountains on the east. The chain of great lakes stretches across the northern end of the basin, and the Mississippi river flows through its centre to the Gulf of Mexico, receiving on its eastern side the Illinois, the Ohio with its affluents, and other large rivers which flow generally west from the water-shed of the Alleghanies; and on its western side the Missouri and other large rivers whose waters descend from the eastern slopes of the Rocky Mountains. The only outlets to this vast basin were by the St. Lawrence River (not then navigable, however) north to the ocean, and the Mississippi river south to the gulf. Hardy pioneers did penetrate across the mountains, by a perilous seven weeks' journey, to the Ohio; but once there, intercourse was but limited with the east. The fertile soil was, however, attractive, and the Indian trade profitable. In 1790 the whole population west of the mountains was 108,868 souls, or about 3 per cent of the whole population of the Union. In 1800 that population had increased to nearly 400,000, but the only outlet for their produce was down the Mississippi through the French territory of Louisiana. That circumstance led to great dissatisfaction, and being adroitly handled by the political adventurers of that day, threatened disunion, by dissolving the states east and west—the latter to form a new confederacy with the south-west and Mexico. The remedy was to purchase Louisiana. Fortunately, at the moment Napoleon had relinquished his projects of forming French

colonies; also being determined on war with England, he feared the seizure of Louisiana by that power, and determined to sell it to the United States for \$14,984,872. This money, in 1803, gave him the sinews of war, and also the hope that the transaction would embroil the United States with his enemy. England did at a later period attempt to take the territories. But the troops who had driven the French out of Spain, embarked from France for the enterprise only to encounter the bloodiest defeat before cotton bags and western rifles. Louisiana was then possessed of a certain amount of population and wealth, which, from being French, by annexation became American. A considerable commerce had grown up. The amount of trade then existing between the eastern and western states may be gathered from the official returns of exports to New Orleans, in the four years before it was annexed, as follows:—

STATES.	1799.	1800.	1801.	1802.
Atlantic,	3,504,092	2,035,789	1,907,998	1,224,710
Western,			1,124,842	1,596,640
Total,	\$3,504,092	2,035,789	3,032,840	2,821,350

The exports from the Atlantic States were mostly foreign merchandise destined for export up the western rivers. The exports of the western states were the produce sent down for sale. Those exports were the productions of hardy adventurers, whom circumstances had induced to seek their fortunes in the west. As long as the commerce of the country was active, and the sales of the farm products of the Atlantic states profitable, there was less inducement to migrate west than there was after the embargo had wrought a change in that respect, and the means of communication *via* New Orleans had improved. When that port became an American city, and the mighty river to its mouth an American stream, a new attraction was added to the fair lands of the valley, and in 1810 its population had risen to 878,315. The impulse thus given to western settlement was strengthened by the effects of war upon the Atlantic states. The interruption of commerce and stagnation of exports threw out of employment large numbers, who now turned an inquiring gaze beyond the mountains. The capital of the east thrown out of commercial employment by the same circumstances, flowed eagerly into banking, in the hope of

INDIAN ENCAMPMENT.



deriving large profits from the growing resources of the west; although inevitable disaster followed the erroneous principles on which that banking was conducted, the capital, so lost to stockholders, really promoted agriculture. Instead of confining themselves to advances on produce shipped, the institutions loaned money to make improvements and build houses that the farm profits could not pay for. The result was ruin to those accepting such advances, and insolvency to the banks making them. From 1810 to 1820 six states grew into the Union, while in the fifteen years that followed 1821 none were admitted.

This is an instructive fact, and it indicates that western land speculation, so much overdone at those periods, was a long time in recovering itself. The process of forming new states is mostly a speculative one. The shrewdest operators get possession of the leading "sites" of future cities, and by stimulating and guiding the tide of migration, become wealthy in the rise of prices that the tide creates around them. As the wealthiest names of the eastern cities were men eminent in commercial enterprise, so were those of the western cities the earliest and most extensive land-holders. The political influence which brings the government patronage upon the theatre of such locations, is a part of the machinery to guide the popular movement. When in seasons of speculation, these operators become possessed of considerable tracts, a period of steady and healthy migration is required to distribute possession among settlers and clear the way for a new excitement. Yearly the trade grows by reason of the increasing surplus that the settlers throw off for market, and which being sold increases their ability to buy merchandise in return.

There are no data by which to measure the growth of trade in those western states after the admission of Louisiana, up to within twenty years, since the accounts were kept only for the foreign trade, and when Louisiana became a state, reports were no longer made. The sales of lands, and population of the new states, progressed as follows, however:—

	1790 to 1800	1800 to 1810
Population, increase,	276,769	492,678
Sales of land, acres,	1,536,152	3,008,982
	1810 to 1820	Total, 1820
Population, increase,	1,201,248	2,079,563
Sales of land, acres,	8,499,673	13,044,807

So rapid had been the settlement from 1810 to 1820. The agricultural productions of that region, as a matter of course, followed this rapid settlement of lands, and the exchange of those productions created a large trade of which there is little record. The mines and manufactures sprung up in the several towns, following the wants of the people.

The cession of Louisiana to the United States had produced a dispute in relation to its boundaries between this country and Spain, which then owned Florida. This dispute became very warm in 1819, when it was settled through the mediation of the French minister, by a cession of east and west Florida by Spain to the United States, in consideration of being released from claims for spoliation of American property to the extent of \$4,985,599, which the United States government undertook to pay its own citizens. The coast line of the United States thus became complete. There were now large interests west of the mountains, a population of over 2,000,000 souls, occupying fertile land, capable of any development, and great numbers were interested in the rapid appreciation of those lands by settlement. The want of communication was a great obstacle. It required seven weeks to reach the newly settled cities of the west; and when during the war it was necessary to send a gun from New York city to Buffalo for defense, it cost six weeks of time and \$1,000 in money to do it. There could be little trade under such circumstances, and the question was to open communication. A canal from the lakes to tide water on the Hudson was commenced in 1817, and completed in 1825. This Erie canal cost \$7,143,789, and soon paid for itself, being the most profitable, as it was the greatest of modern improvements. It opened the door for the great western valley to tide water, and by doing so wrought an immense change in the condition and prospects of all that region. In October, 1823, New York had also completed the Champlain canal, running 63 miles, from Albany to Lake Champlain, at a cost of \$1,179,871. Pennsylvania, in 1825, passed an act for the connection of Pittsburg, on the Ohio, with Philadelphia, a distance of 394 miles. This line was not completed until 1834. In 1828, a company was chartered to connect the Ohio with Georgetown, on the Potomac, by the Chesapeake and Ohio canal. These works gave three outlets from the great basin

to tide water. While yet they were in process of construction, however, a new power was being developed to supersede them for trade and light freights. In 1828, Massachusetts had three miles of railroad; from that nest-egg, capital has since hatched 28,270 miles, which cover the country like a network. The opening of the Erie canal was attended with great results, since it placed the produce of western lands cheaply in competition with that of the valley of the Hudson, and of the less productive states of the Atlantic coast. Commerce and manufactures increased, for the reason that agriculture paid less. The supply of labor changed direction, and the increasing numbers in manufacturing employments drew their subsistence from the west. The natural water courses that discharged themselves into the lakes were lined with settlers, and soon Ohio connected the lakes with the Ohio river, by a canal from Cleveland to Cincinnati, and also to Portsmouth. Indiana projected a canal from Toledo, on the lakes, to the Ohio river, cutting the state nearly longitudinally; and Illinois projected one from Chicago to the navigable waters of the Illinois river, thus connecting the lakes with the Mississippi river, nearly opposite the old French town of St. Louis—across the state. These works were not completed, some of them, until ten or fifteen years after they were undertaken. That of Ohio, however, gave a new impulse to trade, not only by Cleveland, on the lakes, but by way of Cincinnati, down the river to New Orleans. These circumstances gave a new impulse to the sales of land and the settlement of the west. The expenditure of money for the construction of canals, and by the federal government for the construction of the great national road running west from the seat of government to the Mississippi, inaugurated the speculative movement in that direction. The bank fever then raged once more in support of the land movement, as it had done in the six years ending with 1820, and with the same results. \$200,000,000 of money went from east to west, feeding the flame, until all real capital was nearly consumed, and the speculation ran wild until it burst in 1837. At that time a large quantity of land had passed, under the credit sales of the federal government, into the hands of private speculators, and the western fever lay dormant up to the revival that it experienced in 1846–7, by reason of the famine abroad, and the growing

strength of the migration. Attention was then again turned to the lands, and the railroad expenditure began to exert the same influence that canal and bank expenditure had exercised in 1836, and the movement was progressive until the revulsion of 1857.

The natural water courses of the country had been followed by early migrations, and the settlement of the land bordering them had been stimulated by the bank paper speculation of 1810 to 1820. Following the excitement came the construction of the artificial means of navigation, involving an expenditure of some \$50,000,000 for canals through new lands opened up by their operation; and these enterprises were again attended with a great bank expansion, that, although ending disastrously, nevertheless had the effect of drawing capital from England and the wealthier Atlantic states to spread it upon the fertile lands of the west. The subsidence of that speculation left the west in comparative quiet, although of general progress, for some years, during which a new and more powerful element of internal development was coming into action. This was the railroad system.

The first railroad of the country was three miles, built in Quincy, Massachusetts, and in operation in 1828, about the time the success of the Manchester railroad in England astonished the world with the new phenomena of locomotion. The example was not slow of imitation in this country; and the Boston and Providence railroad, uniting those cities by forty miles of rail, to connect with the steamboats to New York, was soon in operation. Its success caused other works to be undertaken in New England, and when the Western road was projected, to connect Albany with Boston, it gave the city a direct connection with the Hudson river and the Erie canal. New York projected the Harlem railroad; and from Albany several roads extended west, connecting city after city, until the united lengths of 380 miles made a continuous route to Buffalo—afterward, in 1850, consolidated in the New York-Central railroad. Another road—the Erie—to connect New York with Lake Erie at Dunkirk (459 miles), through the lower tier of counties, was commenced in 1842 and completed in 1853. Baltimore projected the connection with Wheeling, on the Ohio, 380 miles, by rail, and Philadelphia connected Pittsburg, on the Ohio, 329 miles, by a line of works which became subsequently a continuous railway.



SAW MILLS

The New York railroads were not allowed by law to carry freight until 1850, except on payment of the canal tolls. These four routes opened the western valley by rail to tide water. The Canada roads, connecting Detroit and Buffalo, and Detroit and Portland, make five routes, with distances as follows:—

N. York to Chicago, <i>via</i> Erie, Lake Shore, and Mich. Southern, - - - - -	957
N. York to Chicago, <i>via</i> Central, Canada, and Mich. Central, - - - - -	957
Philadelphia to Chicago, <i>via</i> Pittsburg and Fort Wayne, - - - - -	823
Baltimore to Chicago, <i>via</i> Ohio Central, - - - - -	942
Portland to " " Canada and Michigan Central, - - - - -	1,133

There had been, meanwhile, many western roads built in important localities, which had much favored the export of food in answer to the foreign demand growing out of the famine of 1846-7. In the year 1850, the federal government made a grant of land of about 2,500,000 acres to the state of Illinois, in aid of the construction of the Central railroad, which was to connect Galena, on the Mississippi, and Chicago, on the lake, with Cairo, at the junction of the Ohio and Mississippi rivers. The two roads leaving respectively Galena and Chicago, run south, converging until they meet at a point 50 miles from Cairo, and thence proceed together. The state not being able to do this herself, made over the lands to a company, on condition that they should construct the road. This was commenced in 1852, and finished in 1857, at a cost of \$35,000,000. The tract given by the government was in size equal to the whole state of Connecticut, and was a part of 11,000,000 acres that had been over fifteen years in the market without finding buyers. The fact that the railroad was to run through them, and spend \$25,000,000, and employ 10,000 men in the building of the road, made the lands attractive, and excited speculation. At about the same time the state of Michigan sold the Michigan Central road and the Southern Michigan road to two companies, on the condition of their finishing them, which was done in 1852, establishing a connection between Detroit and Chicago. About the same time the Galena and Chicago railroad was commenced and finished in 1850, making a direct communication from the river at Galena to Chicago, prolonged by the Michigan roads to Detroit, and thence by the Lake Shore to New York, by the Erie or the Central railroads, or *via*

the Canada route to Portland or to Boston. Subsequent connections have been made with the Pennsylvania and the Baltimore roads; and the western connections of Chicago and Milwaukee have been pushed under a vast expenditure of money. The inauguration of land grants by government, in the case of the Illinois Central, has been followed by grants to other states for the same object, until all the grants amount to 25,403,993 acres. These grants have rapidly developed southern connections, until the route is now complete between Chicago and New Orleans, shortening the river route by over 400 miles. While these "trunk lines" were in process of construction, cross roads were multiplied to an immense extent, and the connections of them form a continuous route from Bangor, Maine, to New Orleans, 1,996 miles. This vast chain of railways is composed of eighteen independent roads, costing in the aggregate, for 2,394 miles of road, \$92,784,084, or nearly on twenty-fourth of the whole railway system of the United States.

The progress of the construction by miles in each locality has been as follows, in periods of ten years:—

	East'n.	Middle.	South'n.	West'n.	Total Miles.	Cost.
1828.	3				3	221,101
1830.	3	38	6	6	43	3,501,100
1840.	444	1,436	461	28	2,369	98,170,001
1850.	2,396	2,925	1,415	1,041	7,777	291,482,101
1860.	3,824	8,176	5,552	10,718	28,270	\$1,009,172,000
1870.	4,274	10,791	11,132	22,604	48,801	2,212,412,719

A vast sum of money, amounting in all to \$1,203,240,719, has been expended in the last ten years in the construction of 20,591 miles of road, of which rather more than one-half has been built at the west. There are, in addition to these roads, some 28,000 miles of road incomplete. A considerable amount of this money was drawn from abroad. The iron was got in exchange for bonds, which have not in all cases been paid; but if the bonds were poor, the iron has not been of good quality. The quantity of railroad iron imported in ten years, to 1850, was 242,449 tons, at a cost of \$9,603,587. In the twenty years ending with 1869, the quantity imported was 3,519,896 tons, at a cost of \$281,591,680. This number of tons suffices for about 30,000 miles of road, at 70 lbs. to the yard. The money expended upon the roads in the employment of men and in the manufacture of superstructure, rolling stock, etc., of itself caused an immense activity and demand for produce, which, as a matter of course, became scarce and high upon the theatre of such expenditure. The manufac-

ture of superstructure, cars, locomotives, stations, etc., were the means of employing great numbers of men. The railroad iron, of which the manufacture requires the investment of much capital, was alone imported to any great extent. The remaining portions of the railroads were manufactured at home. The first locomotives in the United States were imported from England in the fall of 1829 or spring of 1830. The first Stephenson locomotive ever imported was the "Robert Fulton," in 1831, for the Mohawk and Hudson railroad. The first locomotive built in this country was constructed at the West Point foundry in 1830, for the South Carolina railroad. Since then the improvement and manufacture of railroads has been so successful as to admit of the export of many American machines. As the roads were completed, and the hands, numbering at least 200,000 men so employed, were discharged, they naturally turned their attention to the agriculture of the neighborhood where they had been employed, and production thus succeeded to consumption. The effect of the railroad expenditure upon the grain crops is to some extent indicated in the following table of miles of roads in operation in the western states at the periods named, and the population and corn product of those states:—

1850.	Miles of Road.	Population.	Bushels of Corn.
Ohio.	299	1,980,329	59,078,695
Indiana.	86	982,405	52,964,363
Illinois.	22	851,470	57,646,984
Iowa.		192,214	8,656,799
Michigan.	344	397,654	5,641,420
Wisconsin.		305,391	1,988,379
Missouri.		682,044	36,214,537
	751	5,391,507	222,191,177
1870.			
Ohio.	3,724	2,675,468	65,250,005
Indiana.	2,977	1,668,169	73,000,000
Illinois.	4,708	2,567,036	121,500,000
Iowa.	2,141	1,181,359	78,500,000
Michigan.	1,200	1,184,653	14,100,000
Wisconsin.	1,491	1,055,501	9,500,000
Missouri.	1,827	1,725,658	80,500,000
Total.	18,068	12,051,844	445,350,005
Increase.	17,317	6,666,337	223,158,828

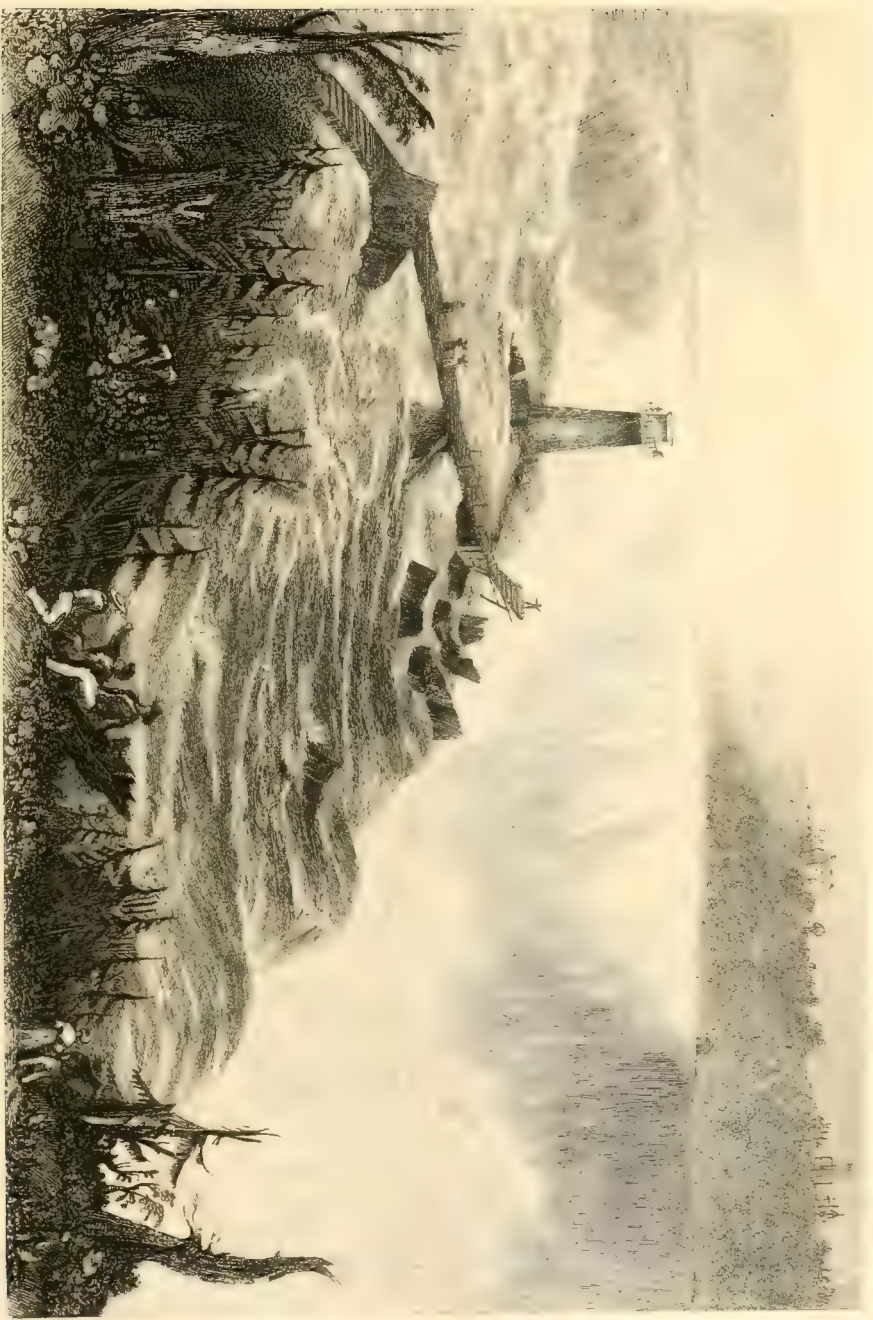
The corn crops had more than doubled, and the wheat crop in the same states had risen from 43,840,637 to 143,500,000 bushels in 1870—an increase of 100,000,000 per annum, worth as many dollars; and estimating the corn at the same aggregate, there had been a sum of \$320,000,000 per annum, or a third

the cost of the railroads built, extracted each year from the soil through their influence. We may now observe what had been the actual sales of the public lands by the government in the forty years ending with 1860, to June 30th, when the fiscal year ends, divided into periods of ten years each; the first, being that of recovery from the speculation that attended the close of the war; the second, embracing the period of bank and canal building excitement; the third, that of recovery from that excitement; and the fourth, that of the last great railroad building excitement. The quantity sold during the fifty years was, it appears, 160,588,005 acres, besides about 286,000,000 acres granted to agricultural colleges, railroads, homesteads, military service, &c.

ANNUAL SALES OF LAND BY THE FEDERAL GOVERNMENT.

	Acres.		Acres.		Acres.
1821,	822,185	1831,	2,804,745	1841,	1,164,796
1822,	763,811	1832,	2,411,952	1842,	1,129,217
1823,	638,749	1833,	3,876,227	1843,	1,605,264
1824,	723,034	1834,	4,658,218	1844,	1,754,763
1825,	871,619	1835,	12,564,478	1845,	1,843,527
1826,	839,263	1836,	20,074,870	1846,	2,263,730
1827,	905,367	1837,	5,601,103	1847,	2,521,305
1828,	913,650	1838,	3,414,907	1848,	1,887,553
1829,	1,236,445	1839,	4,976,382	1849,	1,739,902
1830,	1,880,019	1840,	2,236,889	1850,	709,354
Total,	9,627,716		62,599,771		16,269,421
Pop. . . .	2,233,880		3,707,299		10,454,245
1851,	1,846,847	1861,			
1852,	1,573,071	1862,			
1853,	1,083,495	1863,			9,109,075
1854,	7,035,735	1864,			
1855,	15,719,524	1865,			
1856,	9,227,878	1866,			4,629,313
1857,	4,142,744	1867,			7,041,114
1858,	3,804,908	1868,			6,655,743
1859,	3,911,580	1869,			7,606,152
1860,	4,000,000	1870,			8,095,413
Total.	52,385,782				43,196,810
Pop'n.	15,081,894				17,217,610

The total sales of land, from the opening of the land offices to 1870, including grants under the homestead laws, were 176,488,736 acres. There have been issued land warrants to soldiers, which have taken up large portions of the land. These warrants are for 160 acres, 120 acres, 80 acres, and 40 acres, and have been sold in the markets at \$1 per acre for the smaller lots, and about 80 cts. the larger warrants, by which means the lands come less to the buyer. In addition to the lands sold, the government has donated 69,066,802 acres to schools; 6,851,989 acres to agricultural colleges; 44,971 to deaf and dumb asylums; 12,403,054 to internal improvements; 2,240,184 to individuals; 146,860 to seats of government; 61,076,922 to military services; 514,585 salines to states;



13,980,700 Indian reserves; 17,645,244 private claims; 47,875,246 swamp lands, granted to states; 27,453,522 to railroads, etc.; reserved for individuals, companies, and corporations, 8,955,394 acres; and there remain unsold lands on hand, the trifle of 1,396,286,164 acres.

The population of the land states had increased, it appears, from 2,233,880 in 1830, to 17,217,610 in 1870, during which period of forty years, 174,451,784 acres of land were sold by the Government. These land sales and population are the ground work of the national trade, which grows with the surplus produced by the land settlers. Those people at first make few purchases of goods, but increase them as their surplus produce sells and enables them to do so.

The people who seek new lands on which to rear their future homes and fortunes, are, for the most part, not possessed of much capital, and under ordinary circumstances much is required for a family to perform a distant journey, locate and prepare land and wait until the crops are grown. Nevertheless, pioneers have ceaselessly pushed forward into the wilderness and battled with nature in the shape of forests, animals and savages, until twenty new states and millions of wealth have been added to the Union. The great instrument of this progress, has, under Providence, and in the hands of skilful and determined men, been Indian corn. That grain has been the poor man's capital, enabling him to conquer the wilderness. It needed on his locating his future home but to drop the seed in the fertile soil, and while he busied himself with his new dwelling, a sure crop grew up, which in a few months became food for his family and his animals. The husks furnish his bed and the cobs his fuel. He is thus by the gift of nature furnished with capital for the coming year, until his other crops and young animals have grown. Indian corn has thus given the pioneer a hold upon the land and made his footing firm where otherwise he might have been compelled to succumb to hardships. With every such remove on to new land the circle of trade has increased. A few months only suffice for the settler to furnish a surplus of production in return for comforts that he desires. For this reason chiefly corn figures so largely in the agriculture of the west. The prolific soil throws out quantities far beyond the wants of the planter, and in a region where all are plant-

ers, the supply becomes superabundant and must find distant markets only at rates so low as to leave little to the grower. Two local demands are created for it. The most important of them is to feed hogs, and pork becomes a leading staple export; the other is for distillation, and whiskey is largely exported. The quantity of corn required to make a certain quantity of pork becomes accurately known, and the price of meat rises and falls with that of the grain, as does whiskey also. Thus out of the great staple grain Indian-corn come directly the three great articles of export, corn, pork and its manufacture, and whiskey. Lumber in most new countries is also an important export. As the settlements progress, beef, wool, wheat and other grains, soon follow, and trade increases. While Indian corn has been largely the instrument of settlement at the West, the nature of the country and the fertility of machine inventions have been no less necessary in securing a surplus for sale. If the corn grows readily it could not under the old system be so readily harvested in a region where land belonged to every man, and every man's labor could be applied only to his own service. At the same time no man's labor more than suffices for the wants of his own family. Here machinery steps in, and favored by the level nature of the soil operates to a charm. A man who could with the scythe cut from one to one and a half acres of grass per day, may ride round a field and cut ten acres in a day without fatigue. Instead of a gang to rake and turn and cock, his horse and himself may with a patent rake perform all that labor and more effectually when driven by a shower of rain, than any gang. His grain is cut by the same means and light labor as his grass. It is threshed out by a similar process; his corn is husked and shelled by machines; and when drawn to the railroad depots it is elevated into vast receptacles to be transported rapidly and at small cost to the best market. All these machine aids enable the man whose own labor would scarcely supply the demands of his family to turn out a vast surplus. This surplus seeks the river and lake cities by rail, canal, and steam, to be transported to the Atlantic markets for consumption or export, or may now leave Chicago and Milwaukee on the lakes, or St. Louis and Cincinnati on the rivers for Liverpool direct without breaking bulk. The table of land sales above gives a very good

Cleveland; there are now 49 steamers and 356 sail vessels, with an aggregate tonnage of 54,474 tons owned there. The multiplication of railroads has, however, added of late more to the city business than either canals or tonnage. There are twelve roads running into Cleveland, of an aggregate length of 1,623 miles, and their annual receipts are more than 25 million dollars. These crossing Ohio in every direction, connect the city with Toledo, Columbus, Pittsburg, and New York. With these advantages, and an active commerce with Canada, a large foreign trade sprung up. In 1870 the imports and exports were as follows:

	Vessels.	Tons.	Coastwise.	Foreign.	Total.
Exports...	1,069	302,170	\$76,187,290	\$395,203	\$76,782,593
Imports...	940	288,110	108,249,861	569,984	108,819,845

The trade between Cleveland and Lake Superior has also become important within fifteen years, in which time it has risen to more than \$20,000,000, mostly in iron and copper ore. In 1856-1861, Cleveland had, in common with several of the other lake ports, a growing and flourishing direct trade with Europe through the Welland canal. Ten vessels, of 300 or 400 tons, ran regularly for some time between Cleveland and Liverpool. Owing to the war and the unprofitableness of this trade, it has now very much declined, but the city has become largely interested manufactures, having over \$16,000,000 capital invested in them, with an annual product of nearly \$50,000,000. The coal trade of Cleveland has become large for the supply of the steamers and factories on and around the lakes; the supply is about 700,000 tons per annum. Population in 1870, 93,918.

DETROIT.—This is the oldest of the western cities, having been early occupied by the French, but its progress, like the others, was slow until the opening of the Erie canal. In 137 years, up to 1820, the population had risen only to 1,442 souls. The greatest impulse has been given to Detroit by the formation, in the last ten years, of the railroad system, which connects it with the interior country. The Great Western Railway of Canada, coming 299 miles, has its terminus virtually in Detroit. From Detroit west run the Michigan Central road, 228 miles, to Chicago, and connecting with the whole western net-work of rails; the Detroit and Milwaukee railroad, crossing the Peninsula, 185 miles, to Grand Haven; the Michigan Southern road running also to

Chicago, a road to Lansing, and other smaller roads, in all extending about 1,120 miles. Population in 1870, 79,588.

CHICAGO is the most remarkable of the western cities for its growth. Its location was good, at the southern extremity of the lake, but though it had a fine harbor sufficient for any lake trade, it could not thrive until the back country supplied it with produce to sell, and required of it merchandise in exchange. Though occupied as a garrison in 1812, and a trading port in 1823, it had less than fifty inhabitants till 1832. The Illinois and Michigan canal, connecting the lake with the navigable waters of the Illinois, was commenced in 1836, 100 miles in length. In aid of this work the federal government donated alternate six mile sections of the public lands. The state had also projected a large system of railroad improvements on a scale far beyond its means, and it failed in 1840. Subsequently the means was raised to complete the canal, which was effected in 1850. The yearly arrivals and clearances of vessels in the port are little more than six million tons. In 1870, there were 15 trunk and about 50 other railroads with an aggregate mileage of over 9,000 miles radiating from Chicago as their common centre. The expenditure of about \$450,000,000 in the construction of these roads, and the great development of the country through which they pass has made the growth of Chicago rapid beyond all precedent. The vast grain, live, stock, lumber and mining products poured into it have made it a great commercial city, even beyond what its population would indicate. Over the 9,000 miles of railroad, most of it traversing the finest grain country in the world, the cereals have come in such quantities as to make Chicago the first primary grain port in the world, shipping as it does about 60 million bushels of grain per annum, importing and exporting to the amount of \$250,000,000. Chicago is only six or eight feet above the level of the lake, but the harbor has a depth of thirteen feet of water, and will always be ample for the commerce of the lakes. The number of vessels arriving here in 1870 was 12,739. The new Canadian rules in relation to navigation enable Chicago vessels to clear direct for Europe, and there are a number in the trade by which produce and goods are shipped direct to Europe. The total value of produce exported in 1870 was \$5,034,336. Inasmuch as bread-stuffs are the principal product of the

the commerce of the place, the following table will best illustrate as well the development of agriculture as the chief element of trade :

SHIPMENTS OF FLOUR (REDUCED TO WHEAT) AND GRAIN FROM CHICAGO FOR THIRTY-THREE YEARS.

	Bushels.		Bushels.		Bushels.
1823,	78	1849,	2,769,111	1860,	31,108,759
1829,	3,678	1850,	1,830,930	1861,	59,481,862
1830,	10,000	1851,	4,646,291	1862,	56,477,110
1840,	40,000	1852,	5,873,141	1863,	54,287,345
1841,	58,197	1853,	6,412,181	1864,	46,718,543
1842,	688,907	1854,	12,362,310	1865,	52,268,181
1843,	933,494	1855,	16,633,700	1866,	65,486,323
1844,	1,024,620	1856,	21,583,221	1867,	56,187,909
1845,	1,599,819	1857,	18,032,678	1868,	63,688,358
1847,	2,243,201	1858,	20,435,106	1869,	56,759,515
1848,	3,001,740	1859,	16,753,795	1870,	54,745,903

The following are the shipments of pork, provision, and cut meats, lard, beef, wool, and lumber, for ten years—1861—1870 :

Year.	Pork Barrels.	Provisions and Cut Meats. Pounds.	Lard. Pounds.	Beef. Barrels.	Wool. Pounds.	Lumber. Feet.
1861,	65,196	69,748,388	16,409,832	50,154	1,399,617	189,379,445
1862,	133,910	71,741,010	34,595,123	151,631	2,101,524	189,277,079
1863,	440,152	95,330,815	88,047,78	175,202	3,435,562	237,097,349
1864,	285,590	90,053,722	42,342,570	149,657	7,551,379	263,496,579
1865,	284,744	55,916,009	28,487,407	103,694	9,930,969	385,553,678
1866,	257,470	74,011,584	26,778,398	67,762	12,301,623	422,613,296
1867,	176,851	82,325,522	27,211,235	84,622	11,239,717	518,976,554
1868,	141,321	96,106,191	23,525,821	75,424	13,104,162	551,480,806
1869,	121,635	86,707,466	17,278,670	68,624	8,757,924	581,535,480
1870,	166,785	112,434,168	43,292,249	65,369	15,826,336	585,430,634

MILWAUKEE is one of the chief cities of the western shore of Lake Michigan. It was settled in 1834, and up to 1840 could boast of but 1,700 inhabitants. The population had grown to nearly 20,000 in 1850, to 30,000 in 1853, and to 71,499 in 1870. The growth has been most rapid under the settlement of the country west of it, by means of the large expenditures there made in the last fourteen years for railroads. These in the state of Wisconsin, have an aggregate length of 2,779 miles, and have been constructed mostly in the last fifteen years at an expense of \$60,358,723. The expenditure of this large sum of money, in addition to that laid out by speculators and emigrants, imparted an impulse to the prosperity of the city which is reflected in its population and valuation. The circle of fertile country poured into the city products which were exported from it to the value of \$35,890,288 in 1870, and in return \$59,180,000 worth of goods was imported. The manufactures of the city were also valued at \$23,100,000. The quantity of grain shipped from Milwaukee in 1870 was 28,645,000 bushels, and from other lake ports of Wisconsin 1,561,881 bushels. The grain movement, which is the basis of the city's commerce, indicates the ratio of its growth, and is as follows :—

	Bushels.		Bushels.		Bushels.
1851,	576,480	1854,	2,544,617	1857,	3,757,404
1852,	1,029,379	1855,	3,147,463	1858,	6,155,307
1853,	1,476,339	1856,	3,720,103	1859,	6,435,038
				1860,	16,700,000
				1870,	23,100,000

We may recapitulate these lake cities in the following table, showing the date of settlement, of incorporation, and population at that date, with the population and valuation in 1850 and 1860 :—

	Settled.	Incorporated.	Population.	
Buffalo.....	1801	1832	8,653	
Oswego.....	1820	1848	10,305	
Cleveland.....	1799	1836	4,000	
Detroit.....	1683	1802	700	
Chicago.....	1823	1835	800	
Milwaukee.....	1850	1840	9,655	
Total			34,113	
	Population in 1850.	Total Valuation.	Population in 1860.	Total Valuation.
Buffalo...	49,764	\$18,427,000	117,715	\$112,920,150
Oswego...	12,305	9,107,202	20,910	19,425,800
Cleveland...	17,034	12,102,101	93,918	92,325,000
Detroit....	21,957	10,741,657	79,588	79,809,951
Chicago...	29,863	31,205,000	298,983	358,783,515
Milwaukee...	31,077	18,421,000	71,499	57,805,772
Total....	161,100	\$100,003,960	682,613	712,370,133

Thus these prominent cities have grown up, so to speak, in 35 years, as points where farm produce is received from the country for sale and where goods are furnished in exchange. The whole value of the lake trade has been estimated at \$1200,000,000 per annum, and the transaction of this business has, it appears, created six cities, with a population of 682,610 and a taxable valuation of \$712,330,198. The manufactures have gradually increased in those cities in order to produce a local supply instead of importing, and new inventions in sewing and other machines have promoted that change, as machinery aided the development of surplus produce. The aggregate trade poured upon the lakes from all these sources has been increasingly large. The aggregate quantities of grain shipped from the grain regions are seen in the following table, which shows the routes taken to market :—

	1857.	1858.	1859.
Via Lake Ontario	18,044,354	11,572,995	14,874,961
Via Suspension Bridge	1,049,108	1,900,000	887,778
Via Lake Erie	22,031,164	29,432,121	24,730,582
From Ohio River eastward	4,352,036	6,242,441	4,446,251
Grand total.....	45,476,662	49,447,557	44,349,602

The totals were composed of these following grains :—

	Flour. barrels.	Wheat. bushels.	Corn. bushels.	Oth. Grain. bushels.	Total bushels.
1856,	3,879,189	19,956,025	14,282,632	4,634,969	58,269,571
1857,	3,412,904	17,362,161	8,779,532	2,270,149	45,476,662
1858,	4,602,780	20,794,515	10,558,527	5,080,615	49,447,557
1859,	3,760,285	16,864,812	4,423,096	4,310,269	44,349,602
1870,	3,315,909	36,246,176	1,423,260	1,097,949	45,346,930

These fluctuations follow the course of western business. In 1857 there was a heavy decline under the influence of the panic of that year. In 1858 the speculative consumption of the interior having ceased, the quantities that sought market were less



than in 1856. The railroads also delivered considerable quantities.

The rapid settlement of the west attracted the attention of the Canadians, and they began early with some energy to take measures that should give them their share of it. The St. Lawrence river was for them the only outlet, and to make that serviceable, extensive works were necessary to pass around the rapids, and make navigation practicable from the lakes to the sea. The Welland canal, passing around the Falls and connecting Lakes Erie and Ontario, was constructed, with other necessary works, completing, in 1846, a system, at a cost of \$20,000,000. The tolls on these works were considerable, and duties on goods imported into Canada from the United States were so high as to check trade—the more so that similar duties were imposed in the United States on Canadian goods. In 1850 the navigation laws were repealed, opening the canals and rivers to foreign vessels. The difficulties in the way of navigating the St. Lawrence have since that date been, to a great extent, removed. Many light-houses have been constructed, the system of pilotage has been revised, a service of tug-boats, of great power, and working at moderate rates, has been organized, and the depth of water between Quebec and Montreal has been increased by dredging, so as to permit the passage of vessels drawing eighteen feet six inches. With these changes and improvements a new element has been introduced. The construction of railways had begun to occupy the attention of the public mind in Canada. In 1849 an act of the Colonial Legislature was passed guaranteeing 6 per cent. on half the cost of all the railways seventy-five miles in extent. Three years later the Grand Trunk line, from Montreal to Toronto, and from Quebec to Riviere-du-Loup, was incorporated as a part of the Main Trunk line, and the line from Quebec to Richmond had been commenced. In 1853 the amalgamation of all the companies forming the Main Trunk line was completed, under a Parliamentary sanction with powers to construct the Victoria Bridge across the St. Lawrence, and thereby connect the lines west of Montreal with those leading to Quebec and Portland.

By the aid of all these enterprises combined, there is now in operation in Canada 2,093 miles of railway, including 1,112 miles of the Grand Trunk, the whole connected

with the great winter harbor of Portland, in the state of Maine.

To give effect to this great system of communication, the whole system of tolls upon inland navigation has been abandoned. The whole line of navigation from Chicago to the Atlantic is now free from tolls and lake dues, the ports of Sault Ste. Marie and Gaspé have been made free ports, and it is probable many more will be thrown open. A reciprocity treaty between Canada and the United States was adopted in 1854, which continued in force till March 1866, when, as the two contracting parties could not agree on terms for its renewal, it expired. This treaty designated a number of articles which were to be free from duty, and also granted some concessions in regard to the fisheries in return for some privileges which Canadians received here. The treaty went into operation in the latter part of 1854, and the trade was affected by it as follows:

1860,	18,667,429	22,706,328	23,851,381
1861,	18,883,715	22,745,613	23,062,933
1862,	18,652,012	21,079,115	19,299,995
1863,	28,629,110	31,281,030	24,021,264
1864,	26,567,221	28,987,147	38,922,015
1865,	30,455,989	32,553,841	38,820,969
1866,	26,874,888	29,356,572	54,714,383
1867,	20,548,704	24,323,169	33,604,178
1868,	23,600,717	26,262,272	30,362,221
1869,	20,891,786	24,197,212	32,090,314
	\$362,900,937	\$444,512,595	\$435,443,751
1870,		25,118,604	37,367,076

The exports of United States produce to Canada have been in this period of eighteen years nearly \$73,000,000 less than the imports from Canada. But there have been exported to Canada, in the same time, about \$82,000,000 of foreign goods first received at our own ports, so that the balance of the trade was about \$9,000,000 in our favor. The domestic exports are composed of the produce shipped from the American lake ports, and entered at the Canadian ports.

It will be noticed that on the expiration of the treaty in March, 1866, there was a very manifest effort to crowd Canadian goods into our markets, the imports from Canada being nearly \$16,000,000 more than in any former year, while the Canadians were not disposed to take so many of our goods as usual. This matter, however, speedily regulated itself, and the trade is now very nearly what it was before the treaty was annulled.

The efforts of Canada to obtain the trade, and cause it to pass down the St. Lawrence,

had to overcome, however, the climate, to be successful; for four months in the year that outlet is ice-bound, while the ports of Lake Ontario are never closed by the ice, and offer railroad connection with New York, Boston, and Philadelphia, the former for export and the latter for supplies of manufacture.

CHAPTER II.

RIVER CITIES—ATLANTIC CITIES.

THE development given to the lake cities by the canal and railroad construction, was participated in to as great an extent by the river cities, the course of whose trade flowed downward toward New Orleans as an outlet.

PITTSBURG is situated at the point where the junction of the Monongahela and Alleghany forms the Ohio river, which thence flows to the Gulf of Mexico. The origin of the place dates from its occupation by the French as a post, and its growth is due to its commanding position. It is 301 miles east by north from Philadelphia, and is 130 miles from Lake Erie. The traveller descends the river 450 miles to Cincinnati; 583 to Louisville, Kentucky; 977 to Cairo, where the Ohio pours into the Mississippi; 1,157 to St. Louis, and 2,004 miles to New Orleans. That vast valley collects in its course the produce coming right and left by streams, canals, and railroads, to deliver it at New Orleans, whence ascend the merchandise, tropical products, and materials of manufacture, to be distributed at the commercial and manufacturing ports. The position of Pittsburg was the most important, commercially, until the opening of the Erie canal. Its resources were highly favorable to ship-building, and it supplied the first boats that descended the Ohio. The commerce and ship-building prospered largely during the war of 1812, but after the peace it declined. Since that period manufactures have taken the place of commerce, and it ranks next to Philadelphia as a manufacturing town. The population in 1800 was 1,565, and in 1816 it was incorporated as a city with about 6,150 inhabitants. The population of Pittsburg in 1870 was 86,235, while Alleghany City, across the river, had 53,181, and other suburbs really forming part of the city, about 75,000 more, making a total of about 210,000.

The progress of the city has been as follows:—

	Population.	Value of manufactures.
1816,	6,182	\$1,896,366
1836,	15,481	15,575,440
1850,	46,601	55,287,000
1860,	49,220	70,000,000
1870,	86,235	111,881,000

CINCINNATI was located at the mouth of the Licking river in 1788, in the centre of an area which commanded the commerce of the Miami, the Wabash, the Scioto, the Muskingum, and the Kanawha rivers. These streams delivered large quantities of produce to foster the trade of Cincinnati, which grew with great rapidity, corresponding mostly with New Orleans, to which its merchants sent the produce, and made purchases of goods in the eastern states, which came up the river from New Orleans by a long voyage, charged with heavy expenses for freight, insurance, etc. The exchanges ran on New Orleans against the produce sent down, and these credits were the means of payments for goods. The opening of the Ohio canal to the lakes, to correspond with the Erie canal to tide-water, gave a new outlet for produce of the northern part of Ohio by way of Cleveland, and also a better channel for the receipt of goods. The net-work of railroads has still further multiplied the means of communication. Portland, Boston, New York, Philadelphia, and Baltimore, are almost equidistant from Cincinnati, which by the same means has its markets extended in a broader circle west. The progress of the city has been as follows:—

	Population.	Imports.	Manufactures.	Exports.
1800,	750			
1810,	2,540			
1820,	9,844	\$1,619,030	\$1,059,459	\$1,824,080
1830,	24,331	2,528,590	1,850,000	1,003,560
1840,	31,267	8,270,000	12,788,200	8,101,000
1850,	46,338	16,972,000	17,780,028	15,480,000
1860,	115,366	41,256,199	54,550,184	33,334,896
1870,	1,1044	96,913,274	112,254,000	66,007,707
1870,	218,900	312,978,665	127,459,021	193,517,090

These figures give the rapid growth of the city since the railroads have opened a broader field from which to draw the materials of trade in exchange for merchandise demanded by the growers.

LOUISVILLE, Kentucky, was a port early in 1781, and it made little progress as a city. Its population grew but to 600 in 1800, and was only 4,012 in 1820. The difficulties of navigation were a drawback upon its commerce, until the Portland canal, two miles long, which had been authorized in 1804, around the falls of the Ohio, was opened in 1830. The cost of the work, \$600,000, was paid, one-third by the United

States, and the balance mostly in eastern cities interested in getting goods up the river. A bridge over the Ohio was built in 1836, at a cost of \$250,000. The city was incorporated in 1828, and its population was then 10,336. In 1836 the population was 19,967, and the annual amount of business transacted was \$29,004,202. In 1840 the population was 21,210, and in 1850 it had again doubled, reaching 43,194.

St. Louis was occupied as a French trading post in 1763, and the town was laid out in the following year, with the name of St. Louis, in honor of that Louis XV. who had so little claim to saintship. The first impulse to its growth was, however, the annexation of Louisiana to the United States, when emigrants poured into the new country, bringing with them a spirit of enterprise which soon made visible effects upon St. Louis, the commerce of which struggled

against the difficulties inherent in barge and keel boat navigation. In 1817 the General Pike, the first steamboat, arrived at St. Louis. That event marked a new era, and in 1822, the population being 4,598, the city was incorporated. It was not until the settlement of the north-western states, under the influence of the canals and railroads, that the prosperity of St. Louis became marked. In 1836 the sales of merchandise in St. Louis were given at \$6,335,000; in 1858 the local insurance was \$31,800,232. The population of the city, which had been 63,491 in 1848, rose to 151,780 in 1860, and the city valuation was \$78,463,375. The settlements of the upper Mississippi, east and west, pour naturally an increasing trade into the city, and its railroad connections are now pushing out toward the Pacific. We may recapitulate the leading river cities as follows:—

	Settled. Date.	Incorporated. Date.	1840. Population.	1850. Population.	1850. Valuation.	1860. Population.	1860. Valuation.	
Pittsburg	1784,	1816,	6,150	21,115	46,101	\$27,900,600	49,220	\$40,866,600
Cincinnati	1788,	1802,	890	4,338	113,436	55,670,631	161,044	\$1,861,978
Louisville	1773,	1838,	10,336	21,210	43,194	17,277,000	69,740	30,042,800
St. Louis	1764,	1822,	4,598	16,469	77,500	38,321,201	151,780	78,463,375
Total			21,974	105,221	283,091	\$139,800,032	431,784	\$247,234,763

The numbers and wealth of the river cities have increased in a ratio, perhaps, larger than the lake cities. They divide with the latter the trade of country lying between the lakes and the Ohio river, drawing produce and shipping merchandise, while they have also a strong hold upon southern trade. The business of all those cities, as well lake as river, is but a reflection of the growth of the great seaports. The canals, streams, and railroads that pour forth their products in a southerly direction, and feed the river cities, combine with the other business points of the region to swell the trade of New Orleans, the common correspondent of all; the roads, rivers, and streams that deliver their trade in a northerly and easterly direction, glut the great trunk lines with the merchandise which they pour into Boston, New York, Philadelphia, and Baltimore.

The city of NEW ORLEANS, at the Delta of the Mississippi, is commercially the second city of the Union, and in respect to the exports of domestic produce, it ranks first. Its position is very advantageous, and its growth has been proportional to the development of the country, the resources of which supply it with produce and depend upon it for merchandise in return. The city itself was

founded by the French in 1717, and passed into the hands of the Spanish in 1762. By them it was reconveyed to the French in 1800, and was sold by Napoleon to the United States in 1804. At that time its population, mostly French, was 8,056, and it was rapidly increased by the fact of annexation, which not only carried enterprising men thither, but settled the upper country, which was the source of trade. The city was chartered in 1805. In 1820 the population had increased to 27,176 persons, but the exports of the city still consisted mostly of the produce of the upper country, which a population, increased rapidly by the influence of war and speculation, had greatly developed, although the valley of the Mississippi had not yet attracted cotton planters. In 1830 the trade of the city marked a larger production of farm produce. In the succeeding ten years the migration from the Atlantic cotton states to the new lands of the valley produced a great change in the trade of New Orleans. The cotton receipts rose from 300,000 bales in 1830, to 954,000 in 1840, and tobacco from twenty-four to forty-three thousand hogsheads, and the sugar crop also had risen to 85,000 hhds. The exports were now swollen by the sales of cotton and tobacco,

but, with the operation of the canals and railroads in the upper country, the supplies of home produce had again become important. The progress of New Orleans has been as follows. The figures for 1860 are not published, but the cotton is 30 per cent. higher, and the amount will be about \$200,000,000 received from the interior.

	Population.	Imports.	Exports.	Receipts from Interior.	Receipts of Specie.	Valuation of Real Estate.
1804,	8,056	..	\$1,392,093	..	..	..
1810,	17,242	..	1,753,974	..	..	..
1820,	27,176	\$3,379,717	7,242,415	..	..	..
1830,	46,310	7,599,083	13,042,740	..	..	..
1840,	102,193	10,673,190	34,236,936	\$45,761,045	..	..
1850,	116,375	10,760,499	38,105,350	96,897,873	\$3,792,662	..
1851,	..	12,528,460	54,413,963	106,924,083	7,938,119	..
1852,	..	12,057,724	49,058,885	108,051,708	6,278,523	\$66,350,260
1853,	..	13,654,113	67,768,724	134,233,731	7,865,226	..
1854,	..	14,402,150	60,172,628	115,336,798	6,967,056	..
1855,	..	12,923,608	55,688,552	117,106,823	3,746,037	..
1856,	..	17,183,327	80,547,963	144,256,081	4,913,540	..
1857,	..	24,981,150	91,514,286	158,061,369	6,500,015	..
1858,	..	19,586,013	88,382,438	167,155,546	13,268,013	108,651,135
1859,	168,472	18,349,516	101,734,952	172,952,664	15,627,016	111,193,802
1870,	191,322	14,993,754	107,651,042	205,000,000	..	127,942,781

This table embraces the official figures for population, trade, and valuation. The most marked feature is the small amount of imports as compared with exports. This we shall find to be the reverse with the trade of New York; the trade of the two cities for the past year having been as follows:—

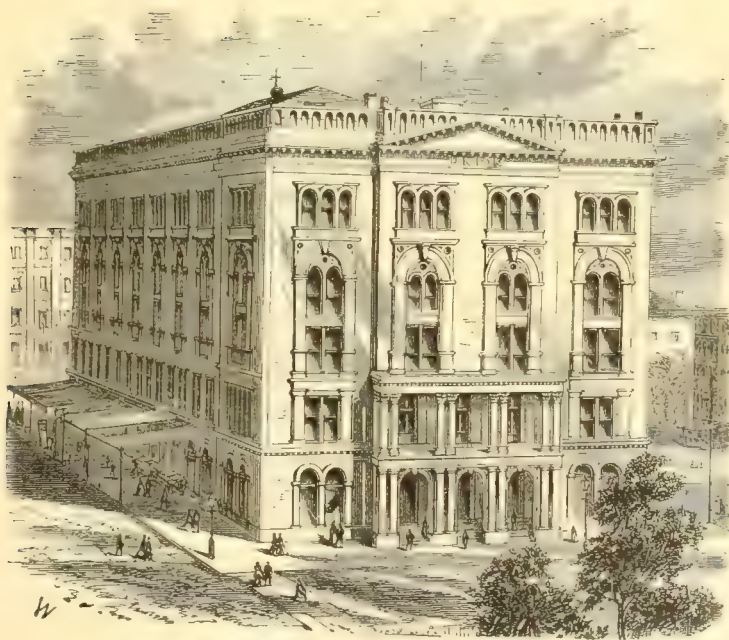
	New York.	New Orleans.
Imports.	\$315,200,022	\$14,993,744
Exports.	254,137,208	107,657,042

The exports from New York, exclusive of specie and foreign goods re-exported, were \$185,740,061, the imports exceeding this by \$129,459,961, while at New Orleans the excess of exports was \$82,564,902. These figures represent the course of trade. The receipts from the interior at New Orleans rose from \$96,897,873 in 1850, to \$172,952,664 in 1859. The vicissitudes of the war made great changes in the commerce of New Orleans, yet these receipts in 1870 were about \$33,000,000 greater than in 1859. Sugar and molasses were \$9,945,245; cotton was \$120,000,000; rice, \$869,340, while farm produce, minerals, &c., made up, together, a little more than \$75,000,000. The lighter merchandise which forms the sum of imports into New York, instead of going round by way of New Orleans, goes across the country on railroads. It follows, that when the west sends forty millions of produce to New Orleans for sale, and has purchased an equal amount of goods in the east, that its money is in New Orleans and its debts in New York. It draws upon New Orleans then to pay New York. New Orleans being so large an

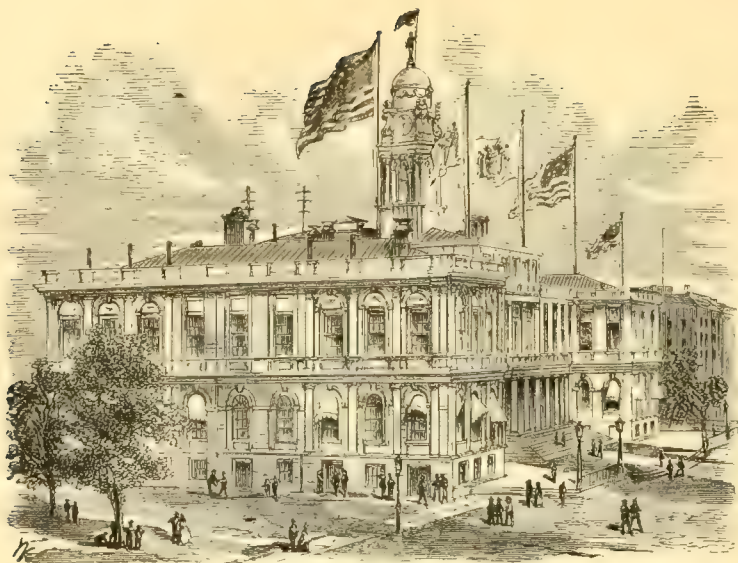
exporter, has large sums due it, for which it draws to meet what it owes to the west for produce. This state of affairs is the basis of bill operations. Firms being connected, one at Liverpool, one at New Orleans, and one at New York, the New Orleans house buys cotton for shipment to England, and draws for it at sixty days on the New York firm; the bill being discounted, places him in funds to pay for the cotton, which will arrive in Liverpool in thirty days. The New York firm draws a sterling bill against it at sixty days, and, with the proceeds, meets the bill drawn on it from New Orleans. The sterling bill is then met by the sales of cotton four months after it was bought. In the mean time, the bill on New York passes into the hands of the western debtors of New York, who send it thither in payment of goods purchased. The sterling bill is sold to the New York importer, who remits it abroad in payment of goods imported. The receipts of cotton and sugar have been very large of late years, but the quantities of western produce resulting from the more rapid settlement of the land under the influence of the railroads, have also greatly increased. In 1840, the value of cotton, sugar, and tobacco received was \$36,124,275, leaving but \$9,591,770 for western produce. In the year of famine the aggregate receipts at New Orleans rose to \$90,033,251, of which \$42,599,361 was western produce. In 1857, those articles were valued at \$49,009,976; flour and grain counting in that year for nearly \$15,000,000. By means of time bills, New Orleans thus furnishes a large capital to dealers; and in years of economy and re-



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THE NEW YORK STOCK EXCHANGE.

trenchment, when the purchases of goods are diminished, it shows a large inward current of specie. In 1851, California supplied a good deal of gold at that point, but changed direction after the establishment of a mint at San Francisco, and the receipts of specie were small at New Orleans in 1855—a speculative year. They became large with the panic year, and continued so till 1861, when the city, joining in the Rebellion, the branch mint was discontinued, and has not since been re-established.

While New Orleans thus expanded its trade, and grew in wealth under the influence of western production, the proportion that it enjoyed was by no means the largest. Each Atlantic city had made efforts to obtain a share, and, with more or less success, Canada sought to attract it down the St. Lawrence. New York built two railroads to aid the canals in connecting the lakes with tide water. Boston formed a connection with the Hudson river, and another with the lakes at Ogdensburg. Philadelphia improved its hold on Pittsburg. Baltimore thrust out its iron arm to Wheeling, and all these offered inducements to trade. The number of tons moved one mile during given years in each shows the progress of trade:

	Tons.	Tons.
Erie canal, 1840.....		312,016,346
New York canals, 1869.....	919,153,611	
New York Central railroad, 1869.....	2,179,419,726	
New York and Erie, 1869.....	817,829,190	2,211,402,527
Increase in tonnage,.....		1,899,386,181

The valuation of this tonnage is nearly \$350,000,000 per annum, and this affords an indication only of the wealth which has passed eastward. Thus, in 1840, the value of western produce, that found market by New Orleans and the Erie canal, was \$51,000,000; in 1858, it was nearly \$400,000,000, or an increase ten-fold, and on this mainly has the prosperity of the eastern cities depended. The exports of the southern ports have grown mostly with the direct export of cotton, and those at the north have added gradually food and manufactures thereto. The general course of trade has been to centralize imports in New York.

CHARLESTON owes its origin to a stock similar to that of New England, since a colony of French Huguenots, flying from persecution, settled there in 1690. It was not chartered as a city, however, until nearly

a century later, viz.: in 1783, when its population was nearly 16,000. The commerce of Charleston is not extensive, but its facilities for internal communications are large, and enjoys the trade of the whole state, together with much of that of North Carolina and Georgia. A canal, twenty-two miles long, connects the Cooper with the Santee river. It has a fleet of steamboats that are running to the neighboring cities, and several lines of packets running to New York regularly. Its most important connection is, however, the South Carolina railroad, running 136 miles to Hamburg, on the Savannah river, opposite Augusta, Georgia. The population and business have been as follows:—

	Population.	Imports.	Exports.
1790,	16,359	\$4,516,205	\$2,693,268
1820,	24,480	3,007,113	8,882,940
1830,	30,289	1,054,619	7,627,031
1840,	29,261	2,318,791	11,042,070
1850,	42,935	1,933,785	11,447,800
1860,	51,210	2,070,249	16,888,262
1870,	48,956	617,094	11,184,208

The importations have decreased and the export also, in consequence of the business depression which followed the war, and from which the city is now slowly recovering.

BALTIMORE was laid out as a town, by Roman Catholics, in 1729, and up to 1765 it contained but fifty houses. The persuasion of the founders still predominates. It is situated on the Patapsco river, fourteen miles from Chesapeake bay, and two hundred miles from the ocean. The harbor is a very fine one. The city enjoys great facilities for commerce, and possesses the trade of Maryland and part of Pennsylvania, while it has of late obtained a good share of that of the western states. It was the great tobacco market of the country, but Richmond now rivals it in that respect. As a flour market, it has few equals. The building of railroads to connect with the interior has greatly promoted the city trade, which has progressed as follows:—

	Population.	Imports.	Exports.
1790,	13,503	\$6,018,500	\$2,239,691
1800,	26,514		12,264,331
1810,	46,555		6,489,018
1820,	62,738	4,070,842	6,609,364
1830,	80,625	4,523,866	3,791,482
1840,	102,313	5,701,869	4,524,575
1850,	169,054	6,124,201	6,967,353
1860,	212,419	8,930,157	10,442,616
1870,	267,354	20,000,000	12,765,052

The importations have been usually followed with increase in exports, but 1870

was an exception in consequence of the Franco-German war, which cut off the European demand for tobacco.

PHILADELPHIA, at the close of the last century, was the first city of America, and though it has not ceased to expand since that time, yet New York, by force of natural advantages, has come to exceed it as a commercial city. Its resources for manufacturing are such, however, as to have given it a high rank in the interior trade of the country. The water-power of the neighborhood is very important, and rails and canals give it command of limitless supplies of raw materials, coal and iron in particular. The position of the city was early improved by the construction of canals to the extent of 336 miles, at a cost of \$24,000,000; and seven lines, composed of 12 railroads, of 567 miles in length, radiated to every point of the compass, having cost \$53,716,201. The canals and roads have swollen the coal receipts of Philadelphia from 365 tons in 1820, to more than 10,000,000 tons in 1870, valued at \$35,000,000 per annum. The population and external trade of Philadelphia have been as follows:—

	Population.	Imports.	Exports.	Total valuation.
1684,	2,500			
1791,	42,520		\$3,436,893	
1820,	108,116	\$8,158,922	5,743,519	\$40,487,239
1840,	238,937	11,080,111	3,841,599	99,321,881
1850,	408,762	12,066,154	4,501,606	
1858,	559,009	12,892,215	6,036,411	155,697,669
1870,	674,022	17,355,815	16,649,828	507,987,900

The city of Philadelphia was first settled in 1627 by the Swedes, but was regulated and laid out in 1682 according to the views of William Penn, and its population in 1684 was 2,500. The city is one hundred miles from the ocean, eighty-seven miles from New York, and 130 miles from Washington. It is five miles from the junction of the Schuylkill and Delaware rivers, extending from one to the other, and its harbor is on the Delaware, or eastern side. Vessels drawing more than twenty feet water cannot reach Philadelphia, and the navigation for large ships below is a little difficult. Pilots take inward bound ships at sea. These circumstances have aided to give Philadelphia, a moderate foreign commerce as compared with the commanding harbor of New York.

But if the foreign commerce of Philadelphia is moderate, owing to physical difficulties, the internal commerce, from sales of manufactures and goods imported at New York, is very large—and the real growth of the city is indicated by her external trade less than that of, perhaps, any other city of

the Union. The census of 1870 showed a population of 674,022. The manufacturing industry of Philadelphia has increased in a remarkable ratio. In 1845 the capital employed in the city proper was \$18,000,000, the production \$21,000,000, and of the neighborhood \$33,000,000.

In 1870 the capital invested in the various industries was given at \$205,564,238, employing 119,532 hands, and producing \$251,663,921 of annual value. In the vicinity the amount is \$47,500,000 additional. These figures denote that Philadelphia is probably the greatest manufacturing city of the Union, and will continue to grow in that direction by the force of the same influences which tend to give New York the commercial preponderance. The trade of the city is on a grand scale, and second to none in the world for magnitude of operations, or successful method in conducting them. A leading store of that city is a model of mercantile method. Each department in the store is alphabetically designated. The shelves and rows of goods in each department are numbered, and upon the tag attached to the goods is marked the letter of the department, the number of the shelf, and row on that shelf to which such piece of goods belongs. The cashier receives a certain sum extra per week, and he is responsible for all worthless money received. Books are kept, in which the sales of each clerk are entered for the day, and the salary of the clerk cast, as a per-centage on each day, week, and year, and, at the foot of the page, the aggregate of the sales appears, and the per-centage that it has cost to effect these sales is easily calculated for each day, month, or year. The counters are designated by an imaginary color, as the blue, green, brown, etc., counter. The yard-sticks and counter-brush belonging to it are painted to correspond with the imaginary color of the counter; so by a very simple arrangement, each of these necessities is kept where it belongs; and should any be missing, the faulty clerks are easily known.

All wrapping paper coming into the store is immediately taken to a counter in the basement, where a lad attends with a pair of shears, whose duty it is to cut the paper into pieces to correspond with the size of the parcels sold at the different departments, to which he sees that it is transferred. All pieces too small for this, even to the smallest scraps, are by him put into a sack, and what is usually thrown away by our merchants,



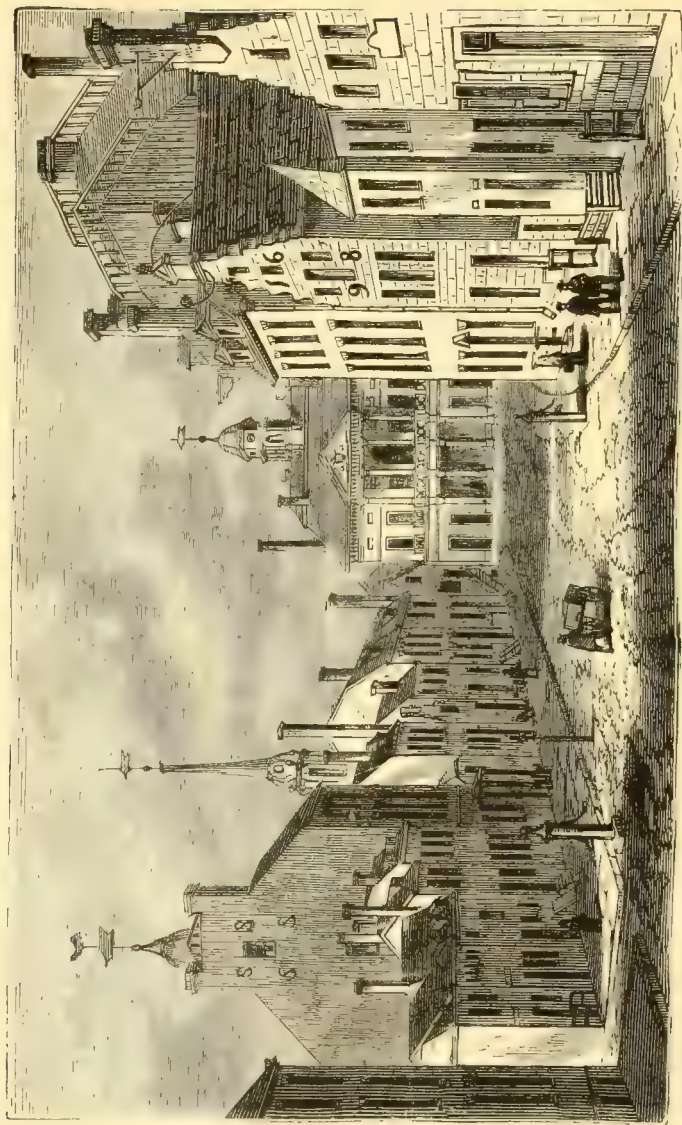
GOV. STUYVESANT'S MANSION, N. Y.,
In olden time



FIRST CLASS DWELLINGS IN EXCHANGE PLACE, 1690.



A. T. STEWART'S RESIDENCE, FIFTH AVENUE, N. Y., FIRST CLASS DWELLING, 1870.



VIEW IN BROAD ST., N. Y., 1796. FEDERAL HALL, FIRST CLASS BUILDING, 1796.

yields to the systematic man some \$20 per year. In one part of the establishment is a tool closet, with a work-bench attached; the closet occupies but little space, yet in it is seen almost every useful tool, and this is arranged with the hand-saw to form the centre, and the smaller tools radiating from it in sun form; behind each article is painted, with black paint, the shape of the tool belonging in that place.

It is, consequently, impossible that any thing should be out of place except through design, and if any tool is missing, the wall will show the shadow without the substance. The proprietor's desk stands at the further end of the store, raised on a platform facing the front, from which he can see all the operations in each section of the retail department. From this desk run tubes, connecting with each department of the store, from the garret to the cellar, so that if a person in any department, either porter, retail, or wholesale clerk, wishes to communicate with the employer, he can do so without leaving his station. Pages are kept in each department to take the bill of parcels, together with the money paid, and return the bill receipted, and change, if any, to the customer. So that the salesman is never obliged to leave the counter; he is at all times ready either to introduce a new article or watch that no goods are taken from his counter, excepting those accounted for.

By a peculiar method of casting the percentage of a clerk's salary on his sales, coupling it with the clerk's general conduct, and the style of goods he is selling, a just estimate may be formed of the relative value of the services of each, in proportion to his salary. By the alphabetic arrangement of departments, numbering of shelves, and form of the tools, any clerk, no matter if he has not been in the store more than an hour, can arrange every article in its proper place; and at any time, if inquired of respecting, or referred to by any clerk, the proprietor is able to speak understandingly of the capabilities and business qualities of any of his employees. Population in 1860, 673,022.

Boston was settled early in the seventeenth century, and in 1684 was the most populous of the Atlantic cities, having 6,300 inhabitants. It is 216 miles from New York, and although possessed of one of the finest harbors on the coast, it had no facilities for reaching the back country, which was for the most part rocky and mountainous, until

railroads were constructed. Its early trade was in navigation and the fisheries. Its first adventure was in 1627, when a sloop, loaded with corn, was sent to Narraganset to trade, and made an encouraging voyage. Its inhabitants soon became rich by doing the trade of others in their celebrated ships, until manufacturing became possible. The energy and intelligence of the race, when turned in that direction, soon drew large profits from their industry, and more freight for their coasting tonnage, which increased as the numbers engaged in manufacture required more food and raw materials. The greatest start was given to the trade of the city when railroads had laid open even the remotest regions of the interior to its enterprise. The general course of its population, trade, and valuation has been as follows:—

	Population.	Imports.	Exports.	Valuation.
1684,	6,300			
1790,	18,008	\$5,519,500	\$2,517,651	\$6,990,890
1820,	43,498	14,426,732	11,008,922	38,288,200
1830,	61,592	10,453,544	7,218,194	61,780,210
1840,	93,743	13,400,925	9,104,462	102,131,201
1850,	136,881	30,374,684	10,681,763	180,000,500
1855,	162,640	45,113,774	28,190,925	249,212,500
1875,	170,000	40,432,710	20,979,853	262,014,500
1870,	250,526	47,524,845	14,108,821	561,085,500

The exports of Boston have taken a great start since 1830, and since then there have been constructed nine lines of railroad, which radiate from Boston in every direction; placing every town in New England in connection with it, and by continuous lines, every city of the Union, from Bangor to New Orleans, St. Louis, Chicago, and St. Paul. The running of the line of Cunard steamers gives it a European connection more prompt and regular than any other. Its extensive trade shows the effect of these connections, and its taxable valuation the wealth that accumulates from its manufacturing industry. That valuation was, for 1870, \$584,089,400, and the population 250,526.

CHAPTER III.

NEW YORK—TELEGRAPH—EXPRESS—GOLD.

THE city of New York, at the close of the revolution, was the second city of the new world, taking rank after Philadelphia. Its internal trade was limited to the capacity of the Hudson river, but its traders pushed across to Lake Champlain, and even to Lake Ontario, whence they drew skins and furs from the Indians, and brought down some of the produce of Vermont and New Hampshire. At this date there was little trade west of Albany. The trade was mostly with the

towns on the east side of the river, and with Rutland, Burlington, and other Vermont towns, as well as the western towns of Massachusetts. Remittances were made from these towns in ashes, wheat, etc., and during the embargo and war, smuggling was very extensively carried on, taking pay in specie. The goods went up the river in sloops. The New England cities had equal commercial advantages, and Philadelphia enjoyed many others in addition. The valley of the Hudson furnished, however, large supplies of farm produce during the wars of Europe, which gave a preponderance to the New York trade, and it began to gain strength. In 1807 the passage of Fulton's steamer to Albany gave a great impulse to the river trade. Her statesmen, however, soon saw the necessity of a more extended inland communication, and the canal, which had been projected before the peace, became a legal reality in 1817, and a physical fact in 1825. The capital of the New York merchants began to be invested in enterprises which resulted in centring trade in the city. The canal connection opened the vast circle of the lake trade to New York city, and poured into its basin the western farm produce at rates far below what the same articles could be raised for at the east. As a necessity, therefore, New York became the point of supply, not only for the foreign trade, but for the neighboring states. The growing manufactures of Philadelphia and Boston found cheaper food in New York than in their own neighborhood, and North river sloops and schooners continued the Erie canal to the Delaware and the Charles river. As new routes to the west, and more extended settlements in that region opened new sources for the supply of produce, and new markets for goods, the tendency was to New York. The capital engaged in commerce at that point being the largest, produce found readier advances and more prompt realization, while the large imports and consignments of foreign goods made the assortment larger and the average cost less there than elsewhere. The same circumstance that drew produce into New York bay, also drew eastern manufactures to the same point, and this increased the assortment which was to be found at the common centre. The fact that produce tended generally to New York, as a matter of course made it the centre of finance. The United States government, and bank, and mint had

been established at Philadelphia. Those circumstances could not, however, control the currents of trade. The pork, and corn, and wheat of the west, the manufactures of the east, the tobacco, cotton, and rice of the south, being sent to New York to obtain advances, it followed that from all quarters bills drawn against produce ran on New York. Those bills found buyers among the country dealers, who, in all directions, wanted to remit to New York to pay for goods there purchased. Capital could not keep aloof from the focus of transactions, and all loans to be made or financial operations to be conducted, sought New York. For the same reason all funds seeking investments went there to find them. Produce, goods, raw material, capital, all operated in reference to New York, and the foreign trade was the motor which kept up the circulation. This tendency to a centre once commenced, cannot be turned, but it strengthens with the general increase of the country. The other cities strive to turn a portion of the current each in its own direction, but the result of those efforts is only to increase the aggregate trade of the whole.

If the amount of specie exported, and for the most part that is but a transit trade from California, is deducted from the New York account, New Orleans will be found to come within \$88,000,000 of it. The lines of communication with the interior, and the facilities for advancing on produce, drew to New York a considerable portion of the western produce, and operations are now there carried on which partake of a speculative character. Pork, flour, etc., are often sold largely for future delivery on the New York exchange; and much of the cotton shipped from southern ports direct to Europe, is resold in New York many times before it arrives out. When the cotton is put on board ship for Liverpool, samples and bills of lading are sent to New York, and the cotton sold "*in transitu*"—that is, during its passage to Europe. Should the ocean telegraph come into operation, this system could be carried to a much greater extent, since news from the Liverpool market could be received at least thirty days after a cargo is shipped before its arrival out; and in speculative times, other articles will be subject to the same operations. The export of corn first became a large business in the famine years of 1847-8, and the subdivisions of qualities, round and flat, yellow,

white, etc., then manifested themselves. In 1859 the crops were greatly beyond any former experience, and every available means of transportation was taken up to convey them to market. The realization of them depends upon the quantities that Europe may require, and this depends upon the events of a few weeks. The steamers now give intelligence in eight or ten days, when formerly thirty were required. Since the

ocean telegraphs have worked, the price of corn in Liverpool is known simultaneously in New York and Chicago, and water transportation pressed to the utmost before the frosts close it.

The proportion which each of the cities named enjoys of the aggregate export trade of the whole country, is seen in the following table:—

EXPORTS OF THE LEADING ARTICLES OF DOMESTIC PRODUCE FROM THE CHIEF ATLANTIC CITIES IN 1870.

	Boston.	Philadelphia.	Baltimore.	New Orleans.	New York.	Total.
Beef.....	\$92,631	\$34,957	\$28,521	\$9,237	\$1,754,953	\$1,920,299
Pork.....	441,698	116,147	110,710	25,914	2,098,345	2,792,814
Lumber.....	223,755	92,556	108,029	30,691	729,692	1,194,723
Furniture.....	448,720	3,181	2,060	2,122	600,520	1,056,603
Petroleum and coal oils.	586,130	11,662,120	452,120	6,920	19,815,159	32,522,449
Butter.....	37,875	13,128	30,694	7,785	415,136	504,618
Cheese.....	7,623	5,018	11,644	2,397	8,824,987	8,851,669
Hams, &c.....	255,511	39,272	52,859	57,341	5,589,822	5,994,505
Lard.....	139,694	234,626	288,657	227,196	4,980,906	5,870,979
Tallow.....	346,547	119,746	65,518	231,969	3,013,415	3,777,195
Cotton.....	148,179	.....	3,393,510	100,686,701	44,076,531	148,304,921
Tobacco, manufactured.	151,345	6,218	35,247	4,657	1,246,669	1,434,176
“ leaf.....	478,226	26,757	3,553,418	3,047,593	12,373,804	19,479,798
Rice.....	7,922	85	18	500	55,157	63,682
Naval stores.....	58,321	10,687	607,787	27,484	1,446,218	2,150,497
Brass manufactures.....	2,764	1,095	2,372	143	150,438	156,792
Iron “.....	1,615,554	384,107	11,832	16,297	8,015,365	10,043,155
Cotton “.....	50,980	5,403	112,203	12,519	2,354,747	3,135,910
Wood “.....	767,770	894,773	771,105	334,125	3,083,275	5,851,048
Gold and silver coin.....	10,073	7,317	19,740	270,366	11,227,516	11,556,012
“ bullion.....	.....	.....	.....	.....	11,674,570	11,674,570
Corn.....	80,519	190,164	224,180	144,624	976,208	1,715,695
Wheat.....	.....	1,504,377	1,293,645	444,180	28,154,215	31,396,417
Flour.....	1,160,653	923,955	2,320,651	1,611,270	11,614,663	17,631,198
Spirits.....	652,952	280	366	1,753	40,846	696,097
Sewing machines.....	117,934	2,460	285	2,155	2,066,224	2,187,058
Total.....	\$7,784,376	\$16,278,329	\$13,507,177	\$107,237,091	\$186,983,288	\$331,963,180

The opening of the Erie canal in 1825, gave the first decided impulse to the city business, and produced a powerful effect upon its prosperity. The impulse was prolonged under the bank excitement that exploded in 1837. The effect of railroad extension at the West has, in the last twenty-five years, had a still more powerful influence upon its growth. The following table gives the population, imports, exports, and taxable valuation, for a long period:—

	Population.	Imports.	Exports.	Valuation.
1634,	2,600	\$4,579	10,093	
1750,	10,351	267,130	35,632	
1790,	33,131	10,739,250	2,505,415	
1800,	60,489	26,201,000	14,045,079	\$25,645,867
1820,	123,706	23,629,246	13,160,918	69,580,753
1830,	203,007	36,624,070	19,697,983	125,288,518
1840,	312,710	60,440,750	34,244,080	252,233,515
1850,	515,547	111,123,524	62,712,789	286,061,816
1855,	622,994	164,776,511	113,731,238	486,998,278
1861,	813,668	233,718,718	135,036,550	577,230,656
1870,	942,310	315,200,022	254,131,205	965,288,464

Up to the year 1840, the business of the West depended mostly on the canal, and by

way of New Orleans. The city held then a kind of monopoly, but, like all monopolies, it cramped the producers. The large expenditure at the West for bank capital, in the years 1836–37, caused a great credit demand for goods upon New York, which was generally met. The facilities granted in those years by the American bankers in London, for the purchase of goods on credit, placed these within the reach of any dealer who could make a fair show; and the goods obtained on credit required to be sold on the same terms. The rivalry thus produced among those who could command goods, was very great, and the utmost efforts were made to obtain paper in exchange for goods. The banks showed the same eagerness to discount the paper that the merchants did to obtain it, and the mass grew in a rapid ratio, from the small country dealers to city jobbers and importers, and London bankers, until the

Bank of England, in August, 1836, issued a warning to those houses to curtail their credits. This was the "hand writing on the wall"—settling day had come. The business south and west had then been eagerly sought after by the jobbing-houses, who employed drummers to haunt the New York hotels and beset every new-comer with temptations to buy. The drummers of the day had usually no limit placed upon their expenses, which were intended to cover the "attentions" shown to the country dealer. These revelled in the dissipations of the town at the apparent expense of their entertainer, and they could do no less than buy of such attentive friends, when the bill, whether they discovered it or not, would often cover their own and other people's expenses. The mode of business then in vogue, when banks were multiplying so rapidly all over the country, was to take the paper of the dealers, payable at their own local bank. It was supposed that the dealer would be sure to keep his credit good at home. The result showed that the dealer, in order to pay the New York bill, got an accommodation note done at his bank, which thus became the debtor of the New York collecting bank. By this means, although the New York merchant got his money, the west was still in debt to the east; and this continued as long as capital was sent from the east to the west to start banks. The whole system exploded in 1837, and the bank capitals were sunk in these credits. From that date there was to be "no more credit," a threat which has often been repeated without being put in practice. The only permanent change seemed to be to require notes payable in New York. Those are given at dates longer or shorter, but the system is an improvement on the old mode. With 1840 also began the railroad building, which brought stocks and bonds to New York for negotiation, and the money being expended west promoted consumption of goods, which caused a greater demand in New York. The exports of produce increased at higher prices, and the sales of these gave the producers the means of buying more goods. In 1838, thirty-one years after the first successful steamboat, arrived the first ocean steamer, the *Sirius*, at New York, marking a new era in foreign trade, since communication with Europe was now reduced to half the time, a circumstance which was equivalent to an increase of capital engaged in commerce, because it

could be turned oftener. From that date ocean steam navigation rapidly increased. The electric telegraph of Morse began a few years later to exert its influence in facilitating intercourse, and the express system was also introduced. It is somewhat singular, that with the breakdown of the old credit system and the adoption of the plan of making notes payable in New York, four important elements, having the highest centralizing tendencies, began to operate. These were, first, ocean navigation; second, the more extended construction of railroads; third, the invention and construction of telegraphs—there are now 25,000 miles of wires, that have cost over \$2,000,000, consolidated in one company, and New York is the centre for the whole; and, fourth, the express system of intercourse. All these, centring in New York, came into active operation at the moment when gold was discovered in California, to give them an extraordinary impetus. The express business is peculiarly American, and has grown with a vigor which places it among the most important trading facilities of the country. In the spring of 1839, a year after the arrival of the *Sirius* at New York, W. F. Harnden, then out of employ in Boston, was advised by his friends to get a valise and take small packages and parcels from his acquaintances in Boston to their correspondents in New York, and return with what they had to send, making a small charge for his services. He did so, and discovered that a great public want was to be supplied. He soon contracted with the railroad to send a car through with his goods, and with business tact he opened offices, employed messengers, pushing the business with American energy. In 1840 an opposition was started by Adams. In 1841 new fields were explored by Harnden, who ran an express between Albany and Boston, and one between Albany and New York. Route after route was then opened to express agents, penetrating further and further, and multiplying their lines in the densely settled portions of the country; not only between cities, but between different portions of the same city. In 1845, Buffalo was reached by Wells & Co. In 1849, the gold fever brought California within the scope of express operations, and from San Francisco as a centre, "pony" expresses ran to the diggings with great success, placing the solitary miners of the Sierra Nevada in direct connection with the mint and with Wall street. As these busy agents continued to

increase, and lessen the difficulty of communication, trade multiplied as a consequence. The telegraph had also penetrated most direct routes between cities, and that instrument came in aid of the express, which executed an order transmitted by telegraph. Instead of waiting the slow course of the post for a reply, the telegraph gave an instantaneous order for goods that the express conveyed. Thus, the three months that would once have been consumed in coming from Cincinnati for goods and returning, was reduced to three days. All the cities of the union were brought within similar speaking distance. In 1850 it was estimated that the expresses travelled twenty thousand miles daily, in discharge of orders, and the service has since doubled. Steam, the telegraph, and the express, had thus greatly facilitated trade, by making the long semi-annual expeditions to the large cities, for the purchase of goods, unnecessary. The small dealers could now buy frequently in small parcels the goods they found most in demand, instead of buying a six months' stock, and taking the risk of the goods being well selected for the market. This also brought with it another change. It had been the case, that most of the goods sent to America formerly were the surplus stock of the British manufacturers. That is, where patterns had been got up for the home consumption and the regular trade supplied, there would remain a stock that had become comparatively dead by age. This dead stock was "good enough for the American market," and was sent out almost for what it would bring, and being transported into the interior for six months' sales, became a sort of Hobson's choice for the consumers. When, however, frequent arrivals of new goods came to be laid before the customers, they immediately displayed a taste and exercised a choice. Ill-assorted goods would now not sell at all. English refuse became of no value, because American taste was developing itself with considerable strength. The customer was no longer to take what was laid before him; but in order to sell, the dealer was now to exercise his sagacity as to what would please his taste in selecting it, and his judgment in buying it. The manufacturer of dry goods was obliged to follow in the same direction, and the employment of designers became important. It was now that the sagacity and taste of the factory agents were felt to be an indispensable element in the success of a concern. The

production of a design was promptly followed by the judgment of the public, and manufacturing became, as it were, one of the fine arts.

The joint operation of these new agencies manifested itself in 1850, when the west had become enriched with the large sales it had made of its produce during the famine years, and the railroads and canals, then in operation, had profited largely by the high freights and tolls paid by produce on its way to market. The gold of California was now in its turn adding a new stimulus to the business of the city. In 1852 the Michigan roads had opened through to Chicago, and New York was now, by rail, within thirty-six hours of that city. The projection and construction of railroads went on rapidly, constantly adding to the business of New York—the common centre, whence the means to build were drawn, and to which these means returned in the purchase of goods. The Crystal Palace, in 1853, drew great numbers of persons to the city, and gave a start to retail trade, which had an important effect upon the value of real estate and the location of business. In the above table we find that the imports into the city from abroad rose fifty per cent. in the five years to 1855, and the total valuation two hundred millions. This valuation followed the changed location of business. In the speculative times of 1836-7, the old Pearl street house, in Hanover square, was the headquarters of country dealers, and that square the centre of the dry goods trade, around which all others agglomerated. The great fire of December, 1835, by which the lower part of the city and a value of \$18,000,000 was destroyed, broke up the location, which, however, was speedily rebuilt, and, with the rebuilding, the Merchants' Exchange was enlarged and reconstructed at an expense of \$1,800,000. The usual fate overtook occupiers in the inordinate demands of landlords, and the leading firms pushed across Wall street and made Pine and Cedar streets the great centre. Gradually firm after firm ventured upon Broadway, which, in 1845, was visited by a fire that caused the rebuilding of the lower portion, no longer for dwellings, but for substantial stores. One firm went up to the corner of Rector street, one-quarter of a mile from the Battery, and took the site, long vacant, of the old Grace church, at a lease. "Too high up," said conservatism, as the crowd rushed by, and the great retail

firm of Stewart & Co. took the old Washington hotel at the corner of Chambers, and occupied the block with a marble store which then had no equal in any city. Here importing and jobbing are carried on to the extent of \$50,000,000 by one who, by his energy and enterprise, has increased a capital of a few hundreds to millions, and now employs twelve hundred and fifty clerks and others. There were handsome stores before this was built, but this commenced the era of expensive structures. The demands of luxury have led to the erection, up town, of elegant trade palaces of iron, marble, and freestone, for the leading firms in the dry goods, jewelry, clothing, porcelain, and other branches of trade; while the wholesale dealers, invading the old college ground, have covered it with stores of great size and beauty. The centre of business which, thirty years since, was within a fourth of a mile of the Battery, is now two and a half miles distant, and the value of real estate has followed like a "ground swell," reaching incredible rates. A marble store on Broadway was rented in 1860 for \$50,000 per annum, and in 1867 for \$75,000. A lot on Broadway, near Broome, sold in 1859 at private sale for \$110,000; it had been bought at auction in 1852 for \$35,000. An elderly gentleman present remarked, "This lot was part of the old Colonel Bayard farm, and was given by the colonel to his barber for a hair-dressing bill. I have seen it sold four times, and each time people decided the buyer crazy to give such a price." The Society Library lot, corner of Leonard and Broadway, sold with the building in 1849 for \$60,000; after the costly stores erected on it were burned in 1867, it was sold for \$650,000, and a building costing about \$1,100,000 erected on it. The "Central Park," to cover 843 acres, was projected, and has since been prosecuted, at a cost of over \$12,000,000, having employed in the fourteen years, over 50,000 men.

The city has spread toward the upper wards through the agency of railroads, which have enabled workmen and merchants to live further from their places of occupation. The importance of consuming as little time as possible in coming from and going to occupation, made it requisite formerly, that persons should live near their business. The old cities of Europe are thus built with narrow streets and very high houses, to accom-

modate many in a little space. Modern cities are built on a broader scale. Omnibusses first came into play to give a greater breadth to the dwellings of the people, and horse-railroads have still further expanded the area. Manhattan island forming a point at the Battery, runs northerly between the North and East rivers. From the park the city spreads in a fan-like form east and west, and from that point radiate twelve railroads, including the Harlem, which runs by the Fourth avenue to Albany. The eleven other roads run on as many routes, and carry their passengers from three to eight miles, returning with them to a common centre every morning to business. These eleven railroads cost about \$12,500,000. In 1869 they transported about 131,000,000 passengers. There are in New York city thirteen other railroads not having their terminus at the Park, which cost somewhat more than the eleven, and carry altogether nearly as many passengers. In Brooklyn there are thirty horse-railroads which have cost nearly \$25,000,000, and carry about 150,000,000 passengers. The telegraph also comes to play an important part in the city business. Many large firms whose offices are in the lower part of the city, and warehouses and manufacturing in the upper part, connect the two by telegraph, to transmit orders and for information. All the police stations connect by telegraph to give alarms of robbery, and fire alarms are also conveyed by the same means. The "time ball" also operates by telegraph. On the top of the Custom House, sixty feet high, is a mast on which slides a black ball some twenty feet in diameter. This can be seen from any part of the bay. It is hoisted to the top of the pole, and is so arranged that the moment the sun reaches the zenith, by observation, at Albany, it is released by electricity and falls, marking twelve o'clock, by which every ship-master in the port may set his chronometer.

All the railroads, continually running night and day, aided by six stage routes, bring the business and working population to their occupations, and back at night; yet all these routes are insufficient to transport the hundreds of thousands who need conveyance, within a reasonable time, and new routes, elevated and viaduct, have been projected, with cars drawn by steam power, to facilitate rapid transit.



INTERIOR OF A CARPET HOUSE.



INTERIOR OF A DRY GOODS HOUSE.

The aggregate of passengers conveyed each year by the railroads and stages in New York and Brooklyn, is about ten times the population of the United States; the greater number going to and coming from their business by these conveyances every working day. This facility of transit allows business men to concentrate their stores and warehouses around certain points, thus affording better opportunities for purchasers from distant cities and villages to purchase their stocks without spending much time in going from one warehouse to another to select the great variety of goods which go to make up a general assortment. The importers, jobbers, and large dealers reside, of course, at a distance from their warehouses, but they are brought promptly and readily to them by cars, stages, or steamers. Yet these centres of trade change materially every four or five years. The jobbing and importing trade in all articles pertaining to a dry goods stock, are none of them below the Park, and are rapidly concentrating above Canal street, while the retailers of the first class are erecting their magnificent stores in the neighborhood of Union Park. Ten or twelve years ago Lord & Taylor's fine store on the corner of Grand street and Broadway, was regarded as very far up-town for a retail establishment. That, as well as Arnold & Constable's on Canal street, and Stewart's on the corner of Broadway and Chambers street, have now been for some time wholesale stores exclusively. The change is a very great one from the time when even large dealers lived in the dwelling houses over their stores and boarded their clerks.

Perhaps the greatest difference which purchasers who come to the New York market are called to observe, is in the division of the goods. Formerly a dry goods jobber kept a full assortment of every thing in his line, and it required no little tact and exercise of memory to keep each line full. Now, one house confines it-self to woolens, another to cottons, another to silks, and yet another to fancy articles; and even these are subdivided, as in woolens one will keep tailors' goods, another dress goods and women's wear; in cottons, one confines himself to prints, another to the plain goods; in silks, we have establishments for piece goods, and others for ribbons and smaller articles. The tendency is to a still more minute division, and thus we have a dealer in hosiery, a

dealer in lace, a dealer in perfumery, a dealer in pocket handkerchiefs, a dealer in shawls, and one house keeps nothing but suspenders! Thirty years since the manufacture of clothing became a separate business, and it has since subdivided into many branches. There are now establishments exclusively for the sale of spool cotton, and others for braids and bindings, and others still for buttons, for fringes, and for Berlin wool. We are not prepared to say that the division of goods here noticed may not be a positive convenience, although it certainly increases the labor of the purchaser. It has led to greater method in the purchase of goods, and buyers are now provided with catalogues of goods in each department, so arranged as to make purchasing much easier. Buyers now make a corresponding division also of their time, and one day is set apart for woolens, another for silks, and so on through the whole catalogue. Could some staid customer of the last century, awaking from a Rip Van Winkle sleep, be set down at this day in some of our thronged thoroughfares, he would get sorely jostled and foot-weary before he had made a black cross against all the articles upon his memorandum.

The supplies of goods for the country dealers are derived from various sources; small wares from city manufacturers; domestics from the mills or agents; foreign goods from importers or agents of foreign manufacturers. The local manufactures are generally purchased by the jobbers to make good their assortments, as is also the case with hardware, and most articles of domestic manufacture, except the productions of the large mills, which have agents in the city for their special sale.

It was formerly the custom for all parties, manufacturers, importers, jobbers, and houses jobbing in the small way, as well as retailers, to give long credits, six, eight, and twelve months, and the jobbers often sold for open notes, which were frequently renewed wholly or in part when they came due. The panic of 1857, and the hard times of 1861, put an end to most of this. Four months is now generally the longest limit, and many of the best houses sell only on thirty or sixty days time, or for cash only. Custom is now sought in the country by means of agents, instead of by the old system of drummers. Sellers depend largely upon the mercantile agencies for information in relation to the

liability of the buyer. These agencies have ramifications in every town of the country, but their usefulness is not what was at one time expected from them. The grocers who sell sugar, etc., do so generally at from ten to sixty days, and get their money before the dry goods people, who also come after the hardware and earthenware dealers. The supply of capital in the city, under these circumstances, brings to it the largest assortment of goods, and of course it is the best point at which to buy, the more so that at times there is an over supply of goods, which being worked off at auction, realizes a loss sometimes of 25 to 30 per cent. to the importer and foreign owner, and of course to the advantage of the country buyer. The

general attractions offered to buyers make it to the advantage of sellers elsewhere to send their merchandise to New York to meet the purchasers. Boston made, recently, an attempt to break up this, by establishing sales of her manufactures there, instead of sending them to New York. The force of centralization is, however, difficult to overcome, and the imports at New York show an increasing share of the arrivals into the whole country. Thus, in 1870, New York imported \$315,200,022 out of an aggregate of \$462,377,587; in 1840, \$60,000,000 out of an aggregate of \$121,000,000. The proportionate imports at the Atlantic ports are as follows:—

IMPORTS OF CERTAIN GOODS INTO THE LEADING ATLANTIC PORTS, AND ALSO THE TOTAL IMPORTS INTO THE UNION IN 1870.

	Boston.	Philadelphia.	Baltimore.	New Orleans.	New York.	Tot'l into Union.
Gold Bullion	\$13,026				92,159	680,760
“ coin	20,876	17,586		84,446	9,514,749	11,376,190
Silver bullion	1,302			500	40,636	162,432
“ coin	5,581			531,337	3,293,649	14,199,797
Coffee	1,210,044	193,761	6,409,818	2,283,647	12,578,223	24,234,879
Tea	848,369	106	882	6,168	12,206,109	13,863,273
Linseed	1,140,091				2,886,860	4,141,304
Guano		35,342	618,422	5,003	734,726	1,415,519
Wool, raw and fleece ..	2,303,687	33,669	25,763		3,497,254	6,743,350
Wool, shoddy					53,412	55,609
Watches	117,651		12,311	13,156	2,830,692	3,021,875
Coal, bituminous	222,848	332		1,164	276,230	1,110,316
Woolens	4,113,117	40,839	271,123	290,846	28,569,889	34,435,059
Cotton hose	31,547		100,411	61,690	4,388,551	4,734,475
“ goods	775,651	21,648	73,297	1,354,439	15,849,392	18,645,578
Steel, bar and ingot ..	572,338	232,241	41,967	15,233	1,322,492	2,342,408
Silks	882,661	330	108,045	129,306	22,168,766	23,904,048
Linen	1,704,048	8,413	61,868	340,097	14,316,599	16,859,124
Gloves	229,580		19,938	22,881	3,059,987	3,405,966
Window glass	332,938	15,434	14,038	34,002	1,575,949	2,322,504
Gunny bags and cloth ..	133,288		2,064	2,538	133,961	291,218
Iron, bar	1,555,501	214,439	7,155	73,777	855,099	3,156,236
“ pig	326,835	221,709	74,083	214,868	874,267	2,509,280
“ railroad	316,742	113,788	292,623	2,099,567	4,858,971	9,669,571
Cutlery and files	114,208	15,671	26,169	144,579	1,824,016	2,248,819
Jute	157,635	273		4,078	1,537,422	1,799,928
Leather	19,173		17,083	132,251	5,458,624	5,728,028
Hides	3,131,711	8,534	306,877	1,721	9,999,971	14,402,339
Molasses	1,912,447	2,981,538	782,566	263,090	4,635,966	12,888,250
Sugar	7,731,049	5,556,549	7,795,164	1,787,030	30,301,742	56,939,034
Other articles	1,867,308	523,154	301,221	499,929	9,041,854	15,583,831
Total	\$31,731,152	\$10,235,356	\$17,195,890	\$10,367,943	\$208,778,188	\$311,871,006

The aggregate imports at these five ports of these items, are \$278,308,529, which leaves \$33,562,477 of these goods as the imports of all the other ports. The imports of coffee at New Orleans from Brazil, to go up the river, are large; and at

Boston, coffee and hides, from the same source, figure high. But both Baltimore and Philadelphia receive much coffee direct; in fact, that is the largest item of import at those two cities. Boston imports many materials for her manufacture—linseed, wool, jute, hides, etc. Philadelphia also imports some of these. The great mass of the goods, for the consumption of the interior, passes into the port of New York. It is to be borne in mind, however, that many of the importations at New York are really for Philadelphia, Albany, and other cities, even western ones. They are entered at the custom-house by a broker, who pays the duty and forwards them by express to their destination, for a small commission. The express, the rails, and the telegraph, facilitate such operations.

The gold and silver imported at New York are from various sources, but in the last few years have consisted mostly of doubloons and Spanish gold from Europe, to re-export to Havana for the purchase of the sugar crop. In 1857, that movement was very large, early in the year, to the island, and subsequently, when the stock of sugar accumulated very largely in New York, the gold came back from Havana to prevent it from being sacrificed. The bulk of the gold that forms the amount exported, is direct from California, and has been annually since the discovery, in sums of nearly fifty millions.

The gold extracted from the earth by the miners of California has a considerable degree of purity, and before refining establishments were set up in the state, sold at from \$16 to \$20 per ounce. Much was used as a currency. It was carried in little leather pouches, and weighed out to shopmen in exchange for goods. A large portion of it was carried to New York, in the pockets of home-bound adventurers, and sold in New York at such rates as were possible. The buyers mostly had it sent to Philadelphia, by express, at an expense of 3-8 per cent. It was then assayed and coined at the public mint, and the proceeds returned to the owner. This expensive and round-about process led to the establishment of a mint in San Francisco and an assay office in New York, where the miners themselves could deposit the dust and get the full value in return. When the dust is deposited, a certificate of weight is given and the gold in bars returned. There are a number of private assaying houses in San Francisco, where the dust is cast into bars of large size.

Most of these are connected with banking houses, and the bars are the basis of exchange. The express companies deal in this gold. The miner now having a lot of dust, sells it to an express agent, or sends it down to a banker in San Francisco, who has it assayed and cast into bars. The value is credited to the depositor, less the commissions. The bars are mostly shipped to New York, and the bankers draw bills against them in favor of those who have remittances to make to the bank. The competition among the bankers reduces the rate at which these bills can be sold to a point that leaves apparently no profit, and it is charged in some cases that they draw at a loss, in the view of monopolizing the business. The refining leaves a small profit. The cost of shipping the gold to New York may be thus stated: freight, etc., \$1 57; state stamp on bill, 20 cents; insurance, \$1 50—making \$3 27 on \$100. But the insurer gets from the Mutual companies scrip, worth on an average 35 cts., which reduces the cost to \$2 92. The bars sometimes command a higher price in New York than in San Francisco. Thus, a bar of 100 ounces, 880 fine, is at this moment worth *par* in San Francisco, and 900 fine it is worth 87½ cts. premium in New York. This price has reference to the gold only of the bar. There is some silver in each. Thus, in the bar 880 fine there is 88 ounces of gold, 11½ of silver, and 1-2 oz. copper. In the other, 90 oz. gold, 9 1-2 silver, and a half copper. This makes the gold worth½ per cent. more in New York than in San Francisco, and reduces the cost of the bill to \$1 92 per cent. It is evident that he who sells his bills at 2 per cent, makes but 8-10 of 1 per cent, or, including other items, a small loss. If the house feels strong enough to insure itself, it saves the insurance; but this must be more or less a risk to those who take the bills. Thus the operation is one of mere cost of shipment of the gold; but the control of so much gold on paper issued is an object with large firms. The higher value of gold at New York arises from the fact that it is the financial centre of the Union. The exchanges of the country with Europe and with the interior of the states turn there. The south ships its cotton, and tobacco, and rice; the west its produce; and the Atlantic states their manufactures. These, as we have seen, give an aggregate value of over \$300,000,000 sent abroad in a year. The

shippers of these goods draw bills against them, and offer them for sale. The market of sale must be where the greatest demand for them for remittance exists. New York imports two-thirds of all the goods received into the country, consequently the demand is there the greatest for the bills, and they are sent there for sale. It happens that the great majority of bill-drawers are unknown to the buyers, hence there is hesitation in taking their bills. To obviate this, a number of large banking-houses connected abroad, and having great capital, buy the bills that have "bills lading" attached, and the goods are sent to their correspondents abroad. In the seasons of the year when shipments are most active, these bills are plenty and low. They are then purchased and endorsed, and sold with the endorsement at a higher rate when the season advances and the cotton-bills run short. If the demand is active, and the rate of money higher here than abroad, the bankers draw on their own resources, and lend them the proceeds of the bills they sell on stocks or other securities. They are also the buyers of the gold bars as they arrive from California, and pay such rates as the demand for exchange, or the rate of money, or the price of gold on the continent, present or prospective, will warrant. A demand for silver to go to Asia, causes a demand for gold with which to buy it on the continent, and this demand draws upon New York, and indirectly upon the whole country. It is obvious that the bill business is thus mostly in the hands of large bankers. This grows out of the fact that there is abroad no market for bills on New York. Thus, the New York importer of goods, in order to pay for them, buys a bill on ships' specie, instead of ordering his creditor abroad to draw upon him, which would be done if a bill on New York were saleable in the London market. It is understood, that when such amounts of bills from the south and elsewhere are sent to New York for sale, the proceeds of those sales form a large fund due by New York to those sections. These funds are deposited in the New York banks, and by them employed in loans upon stocks, or in such other ways as will pay an interest. Thus the whole country contributes to the supply of capital at that common centre. The New York banks, some fifteen years since, in order to encourage that centralization, allowed interest of 4 per cent. on the funds so deposited. This caused a greater sum to be

so employed, and imposed on the banks the necessity of lending it, in order to make a profit. The amount of funds lying in New York varies from \$50,000,000 to \$90,000,000, according to the season of the year. The banks in all sections of the country that have such funds in New York do not draw against it directly in favor of those who want to remit to New York, but they use the funds to buy up their own or other paper cheap. The effect is to swell the supply of funds in New York, and at times foster speculation there.

The funds that accumulate in New York, make it also the mart for stock operations; and these are very large, as well for regular investments, as for merely gambling operations.

With the creation of any commodity whatever, there springs up almost simultaneously a class of persons to deal in it, and to appropriate more or less capital to its prosecution. This capital is most generally applied to the purchasing of it when it is thought to be cheap, in order to hold it until it can be disposed of to better advantage, or in advancing money to the needy seller. The persons so engaged, by devoting their time and attention to the subject of their traffic, reduce it to science, and soon determine and classify the kinds and qualities adapted to the markets and wants of the public. The dealing in stocks is comparatively of modern origin, and commenced with the credit system of the European governments, at the close of the seventeenth century, when William of Orange avoided the dangers that beset the throne of the Stuarts, by borrowing money instead of extorting it by illegal taxation like Charles I., or stealing it like Charles II. The moment that government stocks—or certificates of debt issued to the government creditors—made their appearance, they became subjects of traffic, and with the certificates of stock in corporate companies, formed the material for speculation, and the exchange markets, where the surplus wealth of communities seek investment, became the theatre for operations in securities. The American colonies had no stock debts or corporate companies, since little surplus capital existed for such investments. The paper money that they issued, however, afforded by its fluctuation many opportunities of jobbing at the expense of the public. When the revolutionary war broke out, the continental

money of the federal government gave a larger field for these operations, which were based mostly on the rapid depreciation of their value. Thus, a person would borrow a sum, returnable in the same description in a fixed time. Its value in that time having fallen, he could return it at a profit. Supposing the money to be par, a person would pledge a bag of \$1,000 for paper; a fall of eight or ten per cent. in sixty days would enable him to redeem his dollars with \$100 profit. In the time of the revolution, a stage driver, having a talent that way, made money in the traffic, and subsequently became the head of the largest bank and stock house of his time in New York, ending a long and respected life by suicide. This paper soon perished, and was succeeded by the government stock, representing the public debt. This was soon accompanied by United States and other bank stock, insurance, canal, mining, railroad, etc., to an immense amount. Up to 1825 the majority of the stocks were banks and insurance, but there was no regular stock market. There were brokers who bought and sold stocks, but there was no concentration of operations. In that year the legislature of New York authorized the New York stock board, which has since continued to be the stock market. Within the last twenty years, boards of brokers have been started in most of our large cities. Their operations are, however, to a very great extent, based upon those of New York, with which they communicate by telegraph. The board of brokers sits with closed doors from 10 1-2 A. M. to 12 M.; an irregular session is held about 2 1-2 P. M. There is a president, a treasurer, and a secretary; the latter keeps a list of all the stocks dealt in in the market; the members are admitted by ballot after notice of nomination by one of the board. He must have been at least a year a broker, and on his admission pays a fee of \$450. When the members are assembled, the president proceeds to call the list, and as each stock is named in succession, those who have orders to buy or sell make their offers, and the transactions are recorded, when they become binding upon the members. If any of these defaults he loses his seat until he can pay or arrange the claim. The theory of the board is that it is the reservoir where all stocks held by the public are brought for sale, and where all buyers come, through brokers, to purchase. The number of brokers is some

850, and the commission charged is a quarter of one per cent., that is to say \$25 on \$10,000. The board requires each member to charge not less than a quarter, but as most of them sell again for their customers for nothing, the charge is practically one-eighth.

The quantities of stocks to be dealt in have rapidly increased of late years. A late report of the Secretary of the Treasury gives an approximation of the amount of stocks now in the country; to that return we have prefixed the amount of the same at a previous date:—

	1840.	1871.
United States stocks and bonds.	\$25,000,000	\$1,935,000,000
State stocks	174,906,997	425,132,425
113 cities' & towns' stks & b'ds.	13,107,000	312,000,000
350 counties' stocks and bonds.	1,500,000	125,000,000
1715 national bank stocks.....	290,772,091	436,478,311
State Banks		92,000,000
150 insurance stocks.....	40,101,000	100,000,000
Railroad stocks.....	45,102,208	1,100,000,000
" bonds.....	40,897,792	1,220,000,000
15 canal and navigation stocks..	31,219,911	48,000,000
" bonds.....	19,207,101	46,400,000
45 mining and other co's stocks ..	10,101,201	185,000,000
" bonds.....	1,000,000	7,800,000
	\$692,915,301	\$6,032,810,796

This vast increase of stocks is manipulated mostly upon the New York stock board, and the stocks are to a considerable extent caused to float by the sums sent to brokers by their correspondents in the country and neighboring cities, with which to "operate." The speculative transactions far exceed those of other kinds. The actual investments of capital are not large at the board. Those who take stocks for income do so of the issuers when the proposals are put out, and they hold them like the United States and state stocks, which rarely come on the stock exchange. The mass of the transactions then are of non-dividend paying stocks, that are the foot-ball of speculation, and so pay the operators profits. The brokers are mostly cliques of operators, who, when the market is dull and prices are low, combine, as "bulls," to purchase, producing a rapid rise, in the hope, seldom disappointed, that the speculative community will be tempted by that rise to come in and buy; as they do so the brokers unload themselves upon the buyers, and then become "bears," combining to depress the market, and to compel a fall at least equal to the rise, skinning the outsiders in the process. The speculators generally buy on time, that is, to pay for the stock at their option, any day within thirty or sixty, as the case may be. In this way the buyer pays interest on the purchases. He may also sell to deliver at any day he pleases within a specified time, or "seller's option," or to

deliver at the "buyer's option;" he may borrow stock and sell it in the hope of buying it back cheaper on delivery; he may buy a privilege to deliver a stock at a certain price at a specified time, or not, as it suits him; or he may sell or buy a privilege of taking and paying for a stock or not as it suits him; he may buy cash stock and sell on time. To produce a fall, cliques will sell for cash all the stock they have or can borrow, and then offer time contracts without limit, until other holders are frightened and sell. Confederates keeping up a clamor to alarm the public at such times, all offers to buy are smothered, and orders to purchase are suppressed. On the other hand, a combination for a rise is accompanied by the most astonishing prophecies of a "good time." Considerable quantities are bought on time, the sellers hoping to get them cheaper. Meanwhile the cash stock is bought up and pledged for more money to repeat the operation; the demand for the stock bought on time runs up the rate, and the public are expected to come in with sufficient strength to let the clique all sell out at a profit, when they will be ready for a bear operation. There are numberless modes of varying and combining speculative operations, which would fill a volume. All these time operations were illegal until 1859, when they were all legalized, and a stock debt may now be collected like any other.

The amount of the transactions is immense. In 1840, the aggregate of sales for the month of June was \$3,684,460; of this one-half was bank stock and one-half Delaware and Hudson canal. In June, 1857, previous to the panic, the sales reached \$250,000,000, mostly railroad stocks. In 1871 the sales for May were considerably over \$600,000,000. In a speculative year the stock transactions will run twenty-eight or thirty-eight thousand millions of dollars. Those transactions require a great deal of money to conduct them, and these funds come to New York to a considerable extent from neighboring cities, as well as from the west. They also employ a large portion of the funds of the banks put out "at call," and also the proceeds of bills sold by large exchange houses. Thus we may suppose a house sells on the departure of a steam-packet \$500,000 of sterling bills. This money is paid into bank, and is loaned out on stock securities at 7 per cent. on call, until, by a succeeding packet, it may be called in and re-

mitted in gold to Europe. This operation, on a large scale, will induce the banks to call in their loans to protect their specie, and the value of money will rise in the market. The rule in stock speculation is loss, and the experience of the most fortunate dealers is that the interest and commissions absorb the whole average profits. The funds sent to New York, therefore, for stock-dealing, only contribute to the central profits.

If we were to throw into a tabular form the new agencies of business centring in New York, we should have results as follows:—

	Cost.
Ocean navigation, 15 lines, 135 ships,	\$96,000,000
Telegraphs..... 60,000 miles,	44,063,000
Express companies... 112,000 "	45,000,000
Railroads..... 30,000 "	1,128,000,000
City railroads..... 55 "	23,000,000
Canals.....	59,000,000
	\$1,395,063,000

The number of strangers that are drawn to the city in a year by ocean steamers is nearly 300,000, and they fill the hotels that have of late taken such splendid proportions, and have been carried up to Thirty-first street and Broadway, a distance of three and a half miles from the old business centre. The march of hotels up-town has been steady. The Astor House was, in 1833, the up-town house. From the Astor House to Chambers street was a long remove, in 1840. In 1852 the St. Nicholas advanced a mile to Spring street, and became not only the up-town, but the "upper-crust" of all hotels. In 1854, Niblo's Garden, on Prince street, was occupied by the Metropolitan; and, soon following, the Everett House, taking ground a mile higher, opened on Sixteenth street; and in 1859, superior in distance, size, magnificence, and expense, the Fifth Avenue Hotel opened on 23d street. The Southern, the Grand Central, the Hoffman, the St. James, and a score of others have since been added, besides the family hotels, like the New York, St. Denis, Clarendon, St. Germain, Sping'er, Sturtevant, Prescott, etc. Extravagance is only an allurements. Indeed, the hotel-keepers seem to have followed the advice of Boyden, when he first gave popularity to the Astor. His cracker-baker complained that the waiters were inattentive: "Kill me two of them, and put it in your bill," he briskly replied. And to his partner, who spoke of the exactions of guests, he replied, "Furnish a gold-dust pudding, with diamond

plums, if they require, but charge accordingly." That is the secret of hotel-keeping in New York—let nothing be wanting, not even a sufficient charge. Immense waste, no doubt, attends the system, but it attracts. The splendid arrangements tempt many city families to take up their abode in them; and a small family, even at \$3.50 per day per head, do better than to pay the extravagant rents demanded for fashionable houses, with the attendant expenses. That these things are not done cheaply, the bill of \$91,000, presented to the city of New York by the Metropolitan Hotel for the entertainment of the Japanese ambassadors, is ample evidence. The numerous visitors to New York from the south and west, as well as the constant current of traders, better class of emigrants, and California passengers, fill the hotels of the lower parts of the city; and the whole mass, by their purchases for personal use, make an important part of the city retail trade, of which Broadway is the main locality. The records of arrivals show the average number per day at all the hotels is not far from 3,000, or the immense number of \$1,095,000 per annum. This, at an average of \$3, gives \$3,285,000 for hotel bills alone, but all the expenses cannot be estimated under \$12,000,000. The facilities of railroads and ferries also induce a great deal of trade from surrounding cities and towns within a reasonable distance. Within an area of fifty miles there are few who do not do their shopping in New York, and very many of the small local shops send daily messages to the city to complete orders they may have received. On the other hand, a large quantity of manufactures that were formerly confined to the city are now sent long distances into the country, particularly in the winter, where they are done cheaply by those who are not dependent upon them for a living. The large circle of country thus loses its rural character, and partakes of the metropolitan nature. It follows that, as city localities become known for particular business, and visitors seek them to trade, all of that class of dealers seek business places there, and thus concentrate the business. The fixed population of the city is given by the census at 942,338, and, with the neighborhood more or less connected, the wants of 3,000,000 require to be met from the retail stores of the cities, in addition to the crowds of visitors from

abroad. The retail trade is therefore a very important one, and its vigor, apart from the purchases of visitors, depends in some degree upon the cheapness of food. Where immigration has reached over 1,000 souls per day, composed of persons skilled in almost all employments, and all eager to obtain work, competing with those in the city who live by their occupation, and with those in the country, who are, so to speak, amateurs, it is evident the wages cannot be extravagant, and the amount that can be spared from them, after deducting house-rent and food, is not much in the average. Food is, however, the important item. When that is cheap, trade is more active. An indication may be afforded in flour. The quantity used in New York is 2,400,000 bbls. per annum. In some years the price has been as low as \$4, in others as high as \$15. The difference between these sums is \$26,400,000 in one year. The tax, in years of dear food, thus thrown upon the city is enormous. It fortunately happens, that in years of dear food the food-sellers make more purchases. The influence of such times is very perceptible in the operations of the pawnbroker, whose business it is to lend small sums on the pledge of almost any conceivable article that may be offered. They charge 24 per cent. per annum, and the article, unredeemed at the end of a year, becomes forfeit by sale at auction. The amount of loans in one year was given at \$3,000,000, and the number of pledges 4,875,000, which would give an average of about 68 cents each loan.

While cheap food is an important item in the ability to purchase, yet employment is the main consideration, and this depends upon the prosperity of those sources on which the city depends for its business. These in the long run are progressive, notwithstanding the reactions that sometimes take place, and the diffusion of employments which machine inventions tend to bring about.

The general prosperity of the whole country does not, however, depend upon any locality: all production and all business is constantly seeking the conditions under which it can best thrive. These cannot be dictated; but, being found, the general welfare is as a consequence the greater, and with the general prosperity the common centre must only become the more magnificent.

BANKS IN THE UNITED STATES.

CHAPTER I.

BILLS OF CREDIT—GOVERNMENT ISSUES— UNITED STATES BANK.

THE use of paper money is a modern invention, and may yet be considered but as an experiment, since, from its first emission in the colonies to the present day, paper money has constantly changed its form and the conditions of its circulation. It is not to be inferred that paper money originated on this continent, since it was used long before in the countries of Europe. Its nature has, however, been more developed here, and every phase of it has had full scope of action. The circulating paper is of many forms, such as bills of exchange, promissory notes, government bonds bearing interest, government bonds bearing no interest and not convertible into coin, but receivable for taxes and dues, and lastly, corporation or bank promises to pay coin on demand. There are many other descriptions of circulating paper, but these are the chief that are used. The last two are those which have figured most as money. The intention of paper money is to supply the place of coin where that article is not sufficiently abundant, as was eminently the case with the early colonies. The colonies were none of them rich, and had not been able to import and keep as much of the precious metals as would serve for a currency, that being as much an instrument of commerce as a road or a ship. In substituting paper for coin there is no difficulty as long as the quantity emitted does not exceed the demands of business for a currency. If there is no trade—that is, if no one wants to exchange his commodities for others—there is no want of currency. As the desire to trade increases, a want of money to represent commodities is experienced, and the want is proportioned to the numbers, wealth, and activity of the traders up to a certain point; because when trade is very active, money itself changes hands rapidly and performs more transfers

than when it is sluggish. There must be, however, great confidence in the value of the money, because doubt in that respect instantly checks traffic. The early colonists were in that position. They had commodities which they had raised and made, but they had no currency, or not enough. In this position, in 1690, it became necessary for Massachusetts to send a military expedition to Quebec to drive the French out of Canada. The expedition failed, and the troops came back clamorous for pay. The colony had no money to pay with, and it adopted the expedient of issuing promises in convenient amounts. The faith of the colony was pledged for the payment of these, and they would be received for taxes and dues. It will be observed, that these bore no interest, and were not convertible into coin. They were, in fact, mere orders of the government upon farmers and others for food, clothing, etc., in favor of the soldiers, to be called in by taxes, not to be paid in money. The paper was worth nothing to export. Its only value consisted in its being good to pay taxes with. It is at once obvious that no man wanted more than would suffice for that purpose. The aggregate amount that could be issued was then measured by the sum of the taxes. In order to increase the amount, the colonial government made it a legal tender, that is, compelled creditors to take it for private debts. This was so palpably unjust, and was productive of so many evils, that the home government suppressed it. Nevertheless, the same necessities produced similar devices, and other colonies followed the example of Massachusetts with similar results.

In 1745, Massachusetts, to defray the expense of an expedition to Louisburg, again issued bills of credit to the extent of £3,000,000. This paper speedily depreciated to 11 for 1: that is, £1 in silver was worth £11 in those bills. The English government then sent out £180,000 in silver, to pay the cost of the expedition, and with this

the thrifty colony bought up its own paper at 11 for 1. New York, during the period 1709 to 1786, made thirty-four issues of bills of credit, amounting in the aggregate to £1,563,407, and the depreciation was about 2 to 1; in other colonies much more. The evils attending these issues were very great, but the cause continued to operate, and when the war broke out in 1775, the Congress of the Confederation was forced upon the issue of \$3,000,000 worth of "continental money," as distinguished from the state issues; and to give these issues some firmness, they made them a legal tender. This supply of paper, in addition to the colonial emissions, increased the difficulties, and some of the colonies went a step further and made *personal property* a legal tender, according to appraisals to be made for the purpose. Notwithstanding the general discredit, Congress was obliged to push the issues. In 1779 the amount outstanding was \$160,000,000, and by 1780 it reached \$200,000,000, when the value fell so fast that before the end of the year the bills ceased to circulate. There are those still living who remember giving \$100 for "a cake of gingerbread," or \$10,000 for a hat cocked in the fashion of the day. The whole amount issued by Congress was \$359,456,000, and on the formation of the new government they were purchased at the rate of 1 cent for \$1. The state issues met with similar fate. The entire absence of money thus brought about, with the attendant evils, mainly induced the adoption of the federal constitution, which at once prohibited the states from ever again issuing "bills of credit," or making "any thing but gold and silver a tender for the payment of debts." That is, those prohibitions are a record of the experience derived from the colonial experiments in paper money.

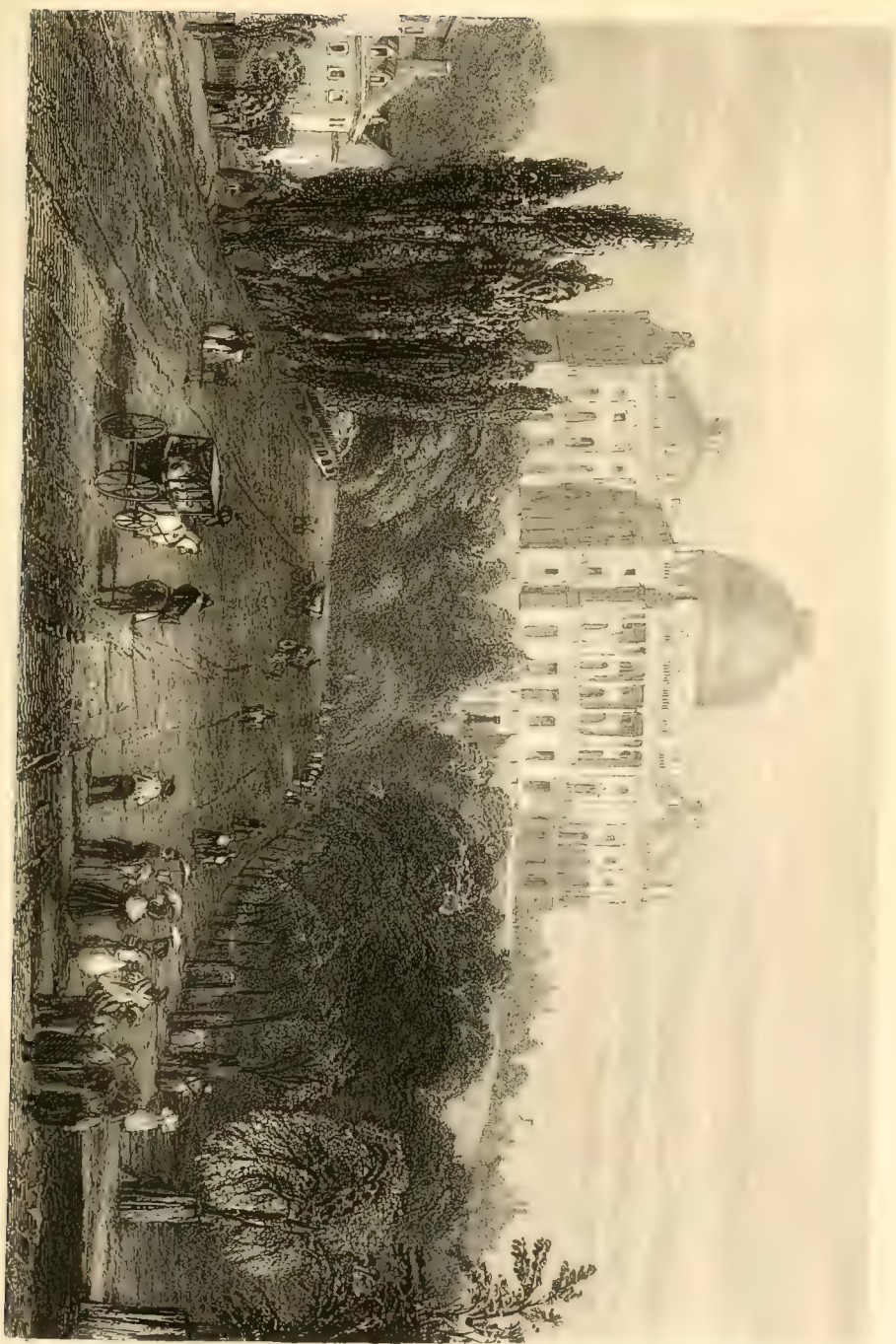
The condemnation of "bills of credit" was a great good. The important question was, however, what to do next; and this engaged all minds. Specie had vanished, and government paper money was dead. Mercantile sagacity had, however, on the death of the continental money, devised a partial remedy in 1781. This consisted of the substitution of private corporate credit in place of government credit, and took shape in the chartering of the Bank of North America, at Philadelphia; the Bank of New York, in the city of New York; and the Bank of Massachusetts, in Boston.

It is an erroneous idea, that was enter-

tained for a long time, that banks, by the issues of credit, create capital, and on this idea many new banks were started, imparting much activity to trade. The good effects of their operation were due, however, rather to the concentration and application of capital to mercantile uses, than to an increase in the quantity of capital. Before the establishment of banks, individuals kept the money they received in their own houses, tempting robberies, and subjecting themselves to loss of interest, and to risk and trouble in seeking small investments. The shopkeeper and merchant who received money in the course of business in small sums, kept it by him until he made his wholesale purchases, when he paid it out altogether. The aggregate sum thus lying entirely idle was very large. On the establishment of a bank, the owners of money deposited it in the vaults. The institution thus became the common receptacle for all idle funds. Inasmuch as that, although all the depositors were entitled to draw their money whenever they chose, yet but a small proportion did so, the banks might safely lend the money so deposited on notes at short dates, sixty to ninety days, and still have as much within their control as would meet the probable demand of the depositors for payment. It was necessary, however, that the notes discounted should be promptly paid at maturity, in order that the bank, itself subject to be called upon to pay on demand, might have control of the means of payment. The discount of mercantile notes with two good endorsers then became the business of banks; and we may here remark in passing, that this wrought a change in the mode of borrowing money in the community. Up to that period, good character, industry, and sobriety were security for loans. An illustration of this is afforded in a bequest of Dr. Franklin in trust to the city (then town) of Boston, of a sum of money from which young mechanics of the above characteristics were to be loaned two hundred dollars to start them in business. They were to repay the money with interest, and the sum, with its accumulation, was to continue a fund for the same purpose. The fund still continues to exist, but without accumulation. Under the newly established banking system, character was no longer an element of credit. A note with two good names became indispensable. The capitals of the banks were seldom paid in loanable

money. They were notes of the subscriber, or real estate, and were mostly designed to inspire confidence. A portion of it was requisite to be kept on hand in specie to meet the calls of depositors and note-holders. The banks, in order to increase their loanable funds, were permitted to issue their own promises to pay specie on demand, these promises to circulate as money. The old colonial issues of credit bills did not pretend to be payable on demand, and the application of that principle, it was now supposed, would obviate the evils that had grown out of the old system. The bills were freely taken and circulated. The institutions were not limited in the amount that they might issue, and they increased the currency almost at pleasure. It became obvious, however, that if one bank issued a larger quantity in proportion than the other banks, its notes, paid into the rival institutions, would immediately be sent back to it for redemption, and it would have to pay in specie the balance above what it held of their notes. Hence the laws of trade compelled each bank to keep its credits within a safe ratio to those of other institutions. This, however, did not prevent all from increasing their issues to any extent as long as their mutual balances were adjusted. When, however, the whole of them increased their circulation, the mass of currency became cheap, a fact which manifests itself in a rise in prices of all commodities. The effect of this is, that the produce of the country ceases to be exported, because it is too high to pay a profit to the merchant, while, on the other hand, goods are imported to avail of the high prices. This state of affairs involves an export of specie, which drains the banks, and forces back upon them their bills for redemption. Hence, if the banks regulate each other by their balances, the foreign trade becomes the common regulator of all. Kept within a certain limit, governed by produce and business, the bank circulation is useful. Although it does not in any degree create capital, it supplies the place of the precious metals as currency. If we suppose a miller wishes to purchase grain; he gets a note or acceptance at sixty days, on New York, discounted at a local bank, which pays out to him circulating notes. With these he purchases wheat of the farmer, flours it, and forwards it to New York for sale, and the proceeds are applied to the taking up of his draft that the bank had dis-

counted. In the mean time the farmer has paid away the notes he took for his wheat, probably to the storekeeper in discharge of his bill. The storekeeper has now to remit to New York to pay a note that falls due for merchandise previously purchased, and furnished to the farmer. To do so he goes to the bank, and buys of it the draft on New York that the institution had discounted for the miller. This he remits to his merchant, who gets it paid from the proceeds of the flour. The transaction is thus closed, and by it farm produce has been got to market, and merchandise, in return, has passed from the manufacturer to the consumer, effecting an exchange of commodities without the use of any money at all. The notes that the bank put out on a draft, after performing the functions of money, returned to it in exchange for the draft, and all obligations were cancelled. This is the operation of paper when confined to actual business transactions. The number and kinds of these are almost infinite, but the principle is the same when the paper is only issued on actual commodities, the exchange of which cancels the obligations that grow out of them. There is, in this, no creation of capital, only the facilitating the exchange of that already created. Under such circumstances, the quantity of currency rises and falls with the quantities of produce and merchandise. The moment the bank lends its notes to speculative operators, who seek to borrow capital itself, rather than credits with which to interchange capital, it becomes insolvent, because it lends what it has not got to spare. The early banks mostly confined themselves to sound rules, and with the rapid increase of business which followed the formation of the new government, their business being profitable, stimulated the increase of institutions, mostly in New England, where commerce was concentrated. The three original state banks were eminently successful, and they suggested a resource to the federal government. This was developed in the celebrated report of Alexander Hamilton, Secretary of the Treasury, in favor of a National Bank. The proposition at once called up the right of Congress to charter a bank under the constitution. After a warm congressional debate upon the subject, President Washington demanded written opinions of his four cabinet officers. The Attorney General and the Secretary of State declared the bank unconstitutional. The Secretary



of War and the Secretary of the Treasury were of a contrary opinion, and the celebrated paper of the latter upon the subject decided Washington, who signed the bill, and the bank went into operation with a capital of \$10,000,000, of which \$2,000,000 was subscribed by the government, and \$8,000,000 by individuals. Of this latter amount, \$2,000,000 was to be paid in specie and \$6,000,000 in six per cent. stock of the United States. The charter was to continue until March 4, 1811. Immediately on the organization of the bank, the shares rose 25 to 45 per cent. premium, and the institution paid 8 1-2 per cent. dividend. The creation of this bank was attended by the rapid multiplication of banks in the various states, becoming rivals to each other, and gradually consolidating an interest which was strong enough in 1811, with other interests, to defeat the recharter of the Bank of the United States. The recharter was opposed on the grounds: 1st, that it was unconstitutional; 2d, that too much of its stock was owned by foreigners; 3d, that state banks were better. It is singular that at a time when capital was scarce in the country, objections should have been made to its coming in from abroad. Nevertheless, the bank was closed, and on settlement paid \$108 1-2 to each share of \$100. From that date, gold and silver only were by law receivable for government dues. The winding up of the National Bank was the signal for creating state banks to fill the vacuum. The old bank and its business was purchased by Stephen Girard, who conducted with it a large private banking business with great success on a capital of \$1,000,000. In four years, to 1815, 120 banks, with an aggregate capital of \$40,000,000, went into operation. Pennsylvania alone, by act of March 21, 1814, created 41 banks. The amount of notes emitted by these institutions was never known with certainty, but was estimated by Mr. Jefferson, in 1814, as high as \$200,000,000. A large portion of these, in the middle states, were issued as loans to the government; and the war pressure became such, that in September, 1814, all the banks out of New England stopped payment. The bills immediately depreciated 20 per cent. in Baltimore, and 15 per cent. in New York. The news of peace, in February 1815, caused some improvement, but in 1816 the difficulties were greater than ever. The discount in Baltimore was 20 per cent., Philadelphia 17, New York 12 1-2. This kind of paper

being the only currency, the government was compelled to take it for dues, in violation of law. This caused the greatest injustice, since the funds received in one place were more depreciated than in another, and New England, where the currency was sound, had great cause of complaint. In such a state of affairs, although the state banks had multiplied to 246, with \$89,822,422 capital, a new National Bank became inevitable, and Congress, by act of April, 1816, again chartered a National Bank, which went into operation January 1817. Its charter was to last until March 4, 1836; its capital was \$35,000,000, of which the United States subscribed \$7,000,000 in a 5 per cent. stock, and the remaining \$28,000,000 was to be subscribed by individuals—one-fourth in gold and silver and three-fourths in the funded debt of the United States. The debts of the bank, in excess of its deposits, were not to exceed \$35,000,000. The bank was to pay a bonus of \$1,500,000, and perform the money business of the government free of charge. In return it received the public funds on deposit, and nothing was to be taken for public dues except specie, treasury notes, notes of specie paying banks, and the National Bank notes. When the bank went into operation it became necessary for the state banks to resume or wind up. Those of New York, Philadelphia, Baltimore, and Virginia resumed, and those which did not were gradually purged off. From 1811 to 1830, 165 banks, with a capital of \$30,000,000, closed business. The loss of the government by these was estimated at \$1,390,707, and the public lost much larger sums. The bank, in the first few years of its operation, encountered many perils, growing out of the foreign trade. Imports poured into the country in prodigious amounts, and an active demand for silver sprung up for Europe and Asia. The institution had, however, in the public stock and in its own stock, forming its capital, the means of drawing specie from Europe, which it did to an extent that subjected it to a loss of over half a million dollars.

The institution was of much service to the government, and enjoyed great facilities from the use of the public funds. The principal bank was at Philadelphia, with branches in most of the large cities. This organization of the bank made it very powerful as a means of exchange, and this power was likely to grow with the increasing wealth of the country, up to the time when railroads and

telegraphs made communication more rapid. The power of the bank was based upon the federal finances, of which it was the agent, and it operated through the growing business of the country, which was conducted largely upon the credit system. As the country increased in prosperity, other banks, under state charters, sprung up, and these became the recipients of mercantile deposits, or, in other words, of the money which each merchant received in the course of his business, and also of private funds. The merchants who thus placed their funds with the banks were constantly debtors of the government for duties and taxes; these they paid by checks on their respective banks. The United States Bank, being the common recipient of all these checks, was thus always the creditor of the local banks, and could always force them to contract their loans by compelling them to pay, or could permit them to increase their loans by being indulgent in regard to balances. The government funds thus collected by the United States Bank were paid out by it wherever the government required. Thus the Boston and New York branches would collect the largest amounts, but the branches in Richmond and elsewhere, or the parent bank in Philadelphia, would pay the drafts of the government. In the first year of the old bank it received \$3,652,000 of the public money. As business prospered, the amount rose annually, until it reached \$17,038,859 in 1808, before the embargo. Thus the receipts and payments on government account were thirty-four millions in a year, when the whole population was 5,200,000 souls. The new bank in 1817 received \$32,786,662 for accounts of the government. The sum declined year by year to \$21,347,000 in the year of crisis, 1825, and subsequently continued at about twenty-four millions per annum, until 1833, when the deposits were removed by the government. These large sums annually flowed in and flowed out of the bank on account of the government, and a large proportion of the payments were on account of the public debt. This reached \$127,334,934 in 1816, and was by annual payments extinguished in 1835, a period of nineteen years; the average amount paid off annually by the government was thus \$6,700,000. The government bank, being furnished with such machinery, was necessarily the best medium of collecting bills; thus the New York mer-

chants, as an instance, sold their goods to the shopkeepers all over the Union, and they took notes payable at the local banks. The credits thus granted could be collected by the United States Bank cheaper than by any other bank. Hence, in New York, the "branch" would be the receptacle for accounts to be collected in all other cities; the bank would forward these to its appropriate branch, say Richmond; the branch there would notify the local merchants of the notes it held against them; these would pay in checks upon the local banks where they kept their deposits, and all these checks collected by the United States branch would make it the common creditor of all the local banks, whose specie it thus controlled; it would notify the New York branch of what collections had been made, and these would credit the mercantile owners with the amounts. The power of the bank from this source, operating through all its branches, was much greater than from the use of the government funds, and the state banks complained loudly of the tyranny that they alleged it exerted over them. A stormy opposition was thus formed against it, while, on the other hand, a generation of merchants had grown up under its administration of the exchanges, and they feared the results of a change. Meanwhile, the question became political, and a great party, as early as 1829, gave indication that the recharter in 1836 would not be granted. A struggle between the bank and the government ensued, and in 1833 the President removed the public deposits from the bank and placed them with numerous state banks. These ran a race of expansion with the United States Bank; the consequence was an immense speculation, which resulted in general bankruptcy in 1837. The government, on removing the deposits to the state banks, enjoined them to be liberal to the merchants. This was done in the view of counteracting the stringency which the closing up of the United States Bank was expected to cause. This did not occur, however, since that institution also was liberal with its loans. A rapid expansion resulted from this rivalry, and speculation ran wild, particularly in public lands. In the midst of this excitement, the government issued the famous "specie circular," by which the lands were to be sold for cash, gold and silver only. The effect of this would be either to kill the speculation or to drain all the specie into the land offices;

it did the former. This was followed by a resolution of the Bank of England to cut off credits to American merchants, and the revulsion was precipitated. The charter of the United States Bank was not renewed by Congress, but the same institution obtained a charter from the State of Pennsylvania, February 18, 1836, under the name of the United States Bank of Philadelphia. The terms of this charter were very onerous, such as no institution could pay from profits; the bank consequently failed, in common with all others in the Union, in 1837. It resumed its payments, following those of New York, January, 1839, and struggled on until October 1839, when it finally failed. On going into liquidation, it was found that more than the whole of its large capital, \$35,000,000, had been swallowed up, subjecting the stockholders to a total loss. This disaster was no doubt brought about by its abandonment of sound principles in the vain hope of compelling the government to re-charter it. But the institution had outlived its usefulness; the country had outgrown the circumstances for which such a bank was fitted. We have thus sketched the outline of that bank before glancing at the progress of the state institutions, because, up to 1840, that bank was the controlling power. The progress of banking among the states has been step by step with the growing wealth, population, and commerce of the country. This growth was manifestly too vigorous to permit of the continued existence of any regulating power.

The relative growth of the state banks, and the business of the country proportional to the national bank, was as follows:—

	No.	State banks. Capital.	National bank. Capital.
1791,	3	2,000,000	10,000,000
1811,	89	52,601,601	10,000,000
1817,	246	89,822,422	35,000,000
1837,	634	290,772,091	35,000,000
1860,	1,562	421,880,095	

Thus the national bank, which began with a capital five times as large as all the state banks, was only one-fifth of their aggregate in 1811. In 1817 the state capital was two and a half times the new National Bank capital, and in 1836 it was eight times that capital. Had it then been re-chartered, with the same amount, it would now have been but one-twelfth of the capital of the state banks.

CHAPTER II.

STATE BANKS—SUFFOLK SYSTEM—SAFETY FUNDS—FREE BANKS.

THE growth of state banks has fluctuated from time to time, under different circumstances of local trade, and the general nature of banks has changed in obedience to similar conditions. The nature of the banking systems of each locality has, however, undergone repeated modifications, and the general tendency is to the circulation of less paper. We shall endeavor to give a sketch of each. The first attempt at banking in New England was the creation of a land bank in 1740. At that time about eight hundred persons subscribed a capital in real estate, and having appointed ten directors, agreed to issue one hundred and fifty thousand pounds in paper, to circulate as money. This was dissolved by Parliament, and the stockholders held individually liable for the bills. In 1784 a bank was chartered by the Massachusetts Legislature, and the other New England states followed the example from time to time. In 1805 there were in existence forty-seven banks in the six New England states, with an aggregate capital of \$13,353,000. In 1815, at the close of the war, these had risen to sixty-three banks, and \$19,053,902 of capital, and the circulation had become large. In 1860 the number of banks in those states had risen to five hundred and five, with a capital of \$90,186,990. In the course of this increase, the system of banking there had undergone less changes than in other states.

The paper currency of New England was generally of small denominations, and emitted by a larger number of banks with small capitals than that of most other sections. These institutions were scattered over the six New England states, and the bills of each bank forming the currency of its neighborhood, would, in the course of trade, ultimately find their way to Boston, the common centre of business. There being no provision for their redemption, they circulated at a discount, and this discount was increased in proportion to the issues of each bank, inflicting loss upon the community. To remedy this, the Suffolk Bank of Boston, in 1825, undertook to receive all the bills and send them home by an agent to the issuing bank, requiring each to redeem in

specie at its own counter. This compelled each bank to keep a large amount of specie on hand, at an expense which ate up the profits of the circulation. They all agreed, in consequence, to keep at the Suffolk about three thousand dollars deposited, to redeem any balance of notes that might be there found against them. To keep down that balance each was then compelled to restrict its circulation to the actual business wants of its locality, that there might be no surplus currency; in other words, that the course of trade might carry to Boston no more of its bills than would be paid by the produce of the locality sent thither for sale, and also to send promptly to the Suffolk any bills of other banks that might come into its hands, as an offset to its own balances. Thus all the banks in New England were actively engaged in running each other, and five hundred streams poured country money daily into the Suffolk receptacle, to be assorted and sent back to the issuers. This kept down the volume of the currency in that section. After the creation of railroads and telegraphs, the difficulty of keeping out an excess of circulation was greater. To be "thrown out of the Suffolk," or, in other words, not be able to meet a balance there, was fatal to the reputation of a bank. The system worked well up to the civil war. It was the case, however, that although those institutions could not put out an excessive circulation in New England, many of them lent their notes on securities, on condition that the notes should be paid out at the far west, whence they would be very slow in returning for redemption. The Suffolk mode of regulation by the laws of trade was, upon the whole, very successful.

In New York the same evils manifested themselves as in New England, and in 1829 a remedy was attempted in the shape of the "safety fund." This did not undertake to restrain the issues of the banks, but to protect the public from loss by failure. Under it all the banks doing business in the state were required to contribute one-half of one per cent of their aggregate circulation to a fund to be called the "Safety Fund," out of which the notes of a broken bank were to be paid in full. This worked very well during a number of years of prosperity, but in the revulsion of 1837 a number of banks failed under disastrous circumstances, and the fund was found to be entirely insufficient—besides being wrong in principle, since it called upon the

honest and well-conducted banks to pay the debts of the dishonest ones. It is hardly worth while, in a short history like this, to enumerate all the restrictions as to discounts, specie on hand, and emission of bills, that the various states have incorporated in bank laws. It may suffice to say, that all are powerless to prevent evil. On the failure of the safety fund system of New York, however, a radical change took place in the policy in regard to banks. The privilege of issuing notes to circulate as money at their own will and pleasure, had been found to be dangerous to the public, and the law of April, 1838, called the "free banking law," was passed, by which the power to issue bills directly was taken from the banks. Under that law, the Comptroller of the state prepared the plates, and delivered the bills to the banks, upon their lodging with him such securities, mostly state stocks, as amply secured the redemption of the bills. The name, "free banking," was given to the law, because it removed from the banks the restrictions relative to discounts, and the necessity for a charter. This law was altered in some respects almost every year of its existence, but its main features remained the same, and it became in New York the sole law to regulate banking. All the old banks, as their charters expired, reorganized under it, since the state constitution provided that no new charters could be granted or old ones renewed. The working of this law was so efficient and popular, that it spread into most of the northern and western states. The progress of banking in New York has been as follows:

NUMBER OF BANKS AND AGGREGATE CAPITAL.

	No.	Capital.	
1801,	5	4,720,000	
1811,	8	7,522,760	
1816,	27	18,766,756	Expiration of first U. S. bank.
1836,	86	31,281,461	Recharter U. S. bank.
1838,	94	36,401,460	Charter U. S. Bk expired; susp.
1857,	294	107,449,143	Free banking law; resumption.
1860,	333	111,441,370	Suspension.
1861,	302	109,982,324	Recovery.
1863,	309	109,258,147	War commenced.
			Organization of Nat. banks.

The New York law requires the banks to issue the bills at the place of their location, and to redeem them at not more than one-half per cent. discount in the city of New York. These institutions, however, have an arrangement with the Metropolitan Bank, in New York, by which they are redeemed at a less rate.

Pennsylvania, in the early part of the century, was slow to create banks, and it had but three up to 1814, in which year 41 new

banks were incorporated. Subsequent'y, it created numbers, and has probably suffered more than any other state from its abused bank credits. The progress of affairs there was as follows, exclusive of the United States Bank, which was situated at Philadelphia:—

No.	Capital.	
1801, 2	5,000,000	
1811, 4	6,153,000	
1815, 42	15,078,000	Expiration of U. S. bank.
1820, 31	14,981,000	Lower credit; 41 new banks.
1836, 49	23,751,338	Twenty-two banks failed.
1838, 49	25,255,783	State charter U. S. bk; susp.
1850, 87	21,555,805	Resumption.
1851, 89	25,843,215	Recovery from panic of 1857.
1853, 94	26,561,337	War commenced.
		Organization Nat. banks.

There was, up to 1830, a great number of unauthorized banks doing business in Pennsylvania, and they presented a constant succession of bankruptcies. The authorized capital down to the present time has not kept pace with that of other states, taking the wealth and population of Pennsylvania into consideration.

Maryland chartered its first bank in 1790, the Bank of Maryland, capital \$300,000, and continued to increase them moderately up to the present time. The progress of capital there has been as follows:—

No.	Capital.	
1801, 2	\$1,600,000	
1811, 6	4,835,402	U. S. Bank expired.
1814, 17	7,882,000	Banks suspended.
1820, 14	6,708,180	
1837, 21	10,438,655	Suspension.
1859, 32	12,560,635	
1862, 33	12,505,559	War in progress.

New Jersey has been influenced to some extent in her banking operations, by the state of things in New York and Pennsylvania, and in 1850 it adopted the general banking law of New York. Its progress has been as follows:—

No.	Capital.	
1805, 2	\$1,000,000	
1811, 3	789,740	U. S. Bank expired.
1815, 11	2,121,933	Suspension.
1820, 14	2,130,949	
1837, 25	3,970,090	Suspension.
1850, 24	3,565,283	Free law.
1855, 32	5,314,885	
1857, 48	7,494,012	Suspension.
1859, 46	7,356,122	
1862, 51	7,933,933	War in progress.

The multiplication of banks in New Jersey under the new law, was mostly for the benefit of circulating their issues in New York at a discount, and they were of but little service to New Jersey.

Delaware has created banks in proportion to its size, in the following ratio:—

No.	Capital.	
1801, 1	\$110,000	
1815, 5	966,000	Suspension.
1819, 6	974,000	
1837, 4	817,775	Suspension.
1849, 2	210,000	Gold discovery.
1859, 12	1,638,185	
1862, 14	1,915,010	War in progress.

Ohio has been, of all the states, the most diversified in its policy in regard to banks. Its first bank was chartered in 1803, but it did not increase charters much until migration set thither after the war of 1812, when the new United States Bank established two branches, one in Cincinnati and one in Chillicothe. The progress of banks was then rapid up to the explosion of 1837, when about 36 of the banks of that state failed under disastrous circumstances, leaving but few in existence on the resumption of specie payments in 1840. In 1845, a new system of banking was introduced, designed to restore that confidence in banks which had been so rudely shaken by the previous failures. It was called the "safety fund system," being composed of thirty-six banks which, together, form the State Bank, under a board of control, composed of delegates from each bank, which furnishes the notes to all for circulation. Each bank must deposit with the board 10 per cent. of its circulation in securities. Of 42 banks started under this law, 36 remained with capital of \$4,034,525. The same law created the "independent system," by which the banks doing business under it must deposit Ohio or United States stock with the State Treasurer to secure the circulation. There were 7 of these banks. There remained the old chartered banks, of which the Ohio Life and Trust—whose explosion in 1857 precipitated the panic which had been prepared for the public mind—was the last. In 1851, the free banking law of New York was adopted; under this 13 banks were started. In the same year, by the new constitution of the state, the legislature was deprived of the right to grant banking powers until the law for so doing should be approved by the people. The general progress in Ohio to 1862, was as follows:—

No.	Capital.	
1805, 1	\$200,000	
1811, 4	895,000	
1816, 21	2,061,927	New U. S. Bank.
1837, 32	10,870,089	Suspension.
1845, 8	2,171,807	State bank law.
1851, 56	7,129,227	Free law.
1854, 66	7,166,581	Free law.
1859, 53	6,701,151	Recovery.
1862, 56	5,539,950	War in progress.

Indiana became a state in 1816, and in 1819 there were two banks, with a capital of \$202,857, and so continued until 1834, when the State Bank of Indiana was created, capital \$1,600,000, and with ten branches, which were mutually liable for each other's debts, and notes under \$5 were prohibited. The bank stopped, partially, in 1837, and resumed payment October, 1841. In 1852 the general banking law of New York was adopted, and under it ninety-four banks were speedily organized, and fifty-one of them soon failed. The charter of the State Bank of Indiana having expired, the legislature chartered a new one, with capital of \$6,000,000, and twenty branches, which bought out the state interest in the old bank, the charter being paid up to January 1, 1857. The progress of the state has been as follows:

	No.	Capital.	
1819,	2	\$202,857	
1835,	10	800,000	State bank.
1837,	11	1,845,000	Suspension.
1839,	11	2,216,700	Resumption.
1841,	11		
1852,	44	5,554,552	Free banking law.
1854,	59	7,281,934	New state bank.
1859,	37	3,617,629	
1862,	39	4,557,654	War in progress.

Eighteen of these free banks, capital \$1203,454.

Illinois came into the Union in 1818, and in 1819 there were two banks, capital \$140,910—one of which had been chartered in 1813, under the territory. It stopped in 1815 and remained so until 1835, when the legislature revived it and increased its capital to \$1,400,000. The constitution of the state in 1818 forbade the creation of any new banks except a state bank, which was chartered in 1819, with a capital of \$4,000,000. This was repealed and a new bank chartered, which speedily failed. In 1835 a new bank was chartered, capital \$1,500,000 to \$2,500,000. These banks suspended in 1837, going into liquidation in 1842, and no banks existed in the state until the adoption of the free banking law in 1851. The general progress to 1862, was as follows:

	No.	Capital.	
1819,	2	\$140,910	
1835,	2	278,739	State bank charter.
1838,	2	5,473,050	Failure.
1843,			Liquidation.
1854,	29	2,513,790	Free banking law.
1857,	45	4,679,325	Suspension.
1859,	103	8,900,000	Recovery.
1862,	18	712,351	War produced a crisis.

Michigan was admitted as a state in January, 1837, but there had been already a

number of small banks authorized by the territorial legislature. These rapidly multiplied under the state, during the speculative year 1837. In the early part of that year there existed 20 banks, with a capital of \$1,918,361. These were a total wreck, and in March, 1838, a general banking law was passed, in order, as was alleged, to throw the business open. In one year, 49 banks, with a capital of \$3,915,000, were projected. Of these, 42 went into operation. Those banks were not required to redeem their issues on demand. The result was utter insolvency, inflicting a heavy loss upon the public. In 1849, the "free banking law" was adopted, with personal liabilities to stockholders. The progress was as follows:—

	No.	Capital.	
1835,	8	\$658,980	Territorial government.
1837,	9	1,400,000	State and general law.
1838,	43	2,317,765	Revulsion.
1844,	3	202,650	Liquidation.
1849,	5	392,530	Free law.
1859,	4	755,461	
1862,	4	786,455	

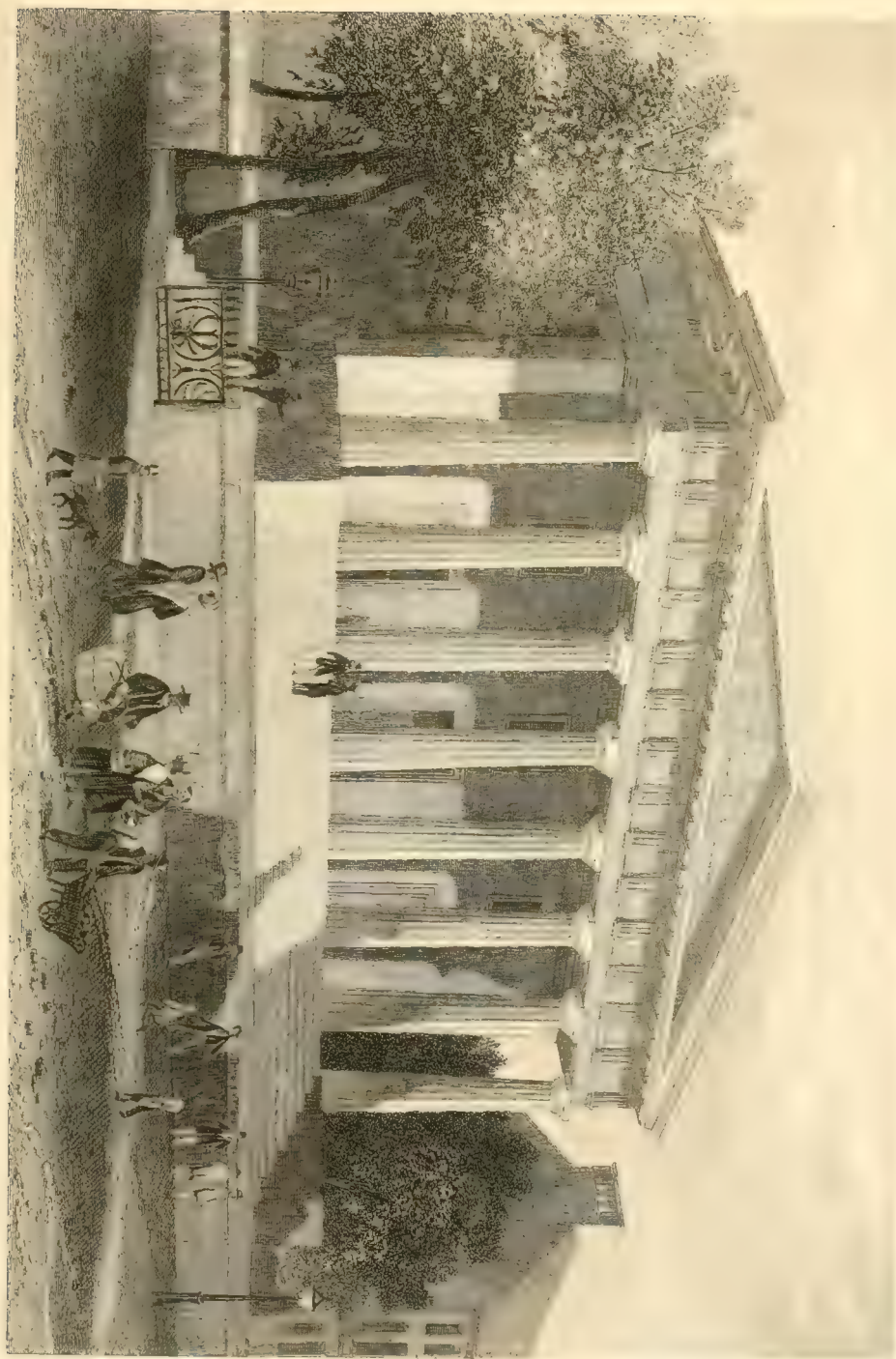
Iowa was admitted into the Union in 1846. It had at Dubuque the Miners' Bank, chartered by Wisconsin before the erection of Iowa territory, in operation since 1838. In 1858 it adopted the free banking law, and authorized a State Bank, which, with its branches, organized in 1859. In 1862, the State Bank and its 15 branches had \$720,-890 capital.

Wisconsin was admitted into the Union in 1848. It had, during some ten years, two banks, that of Mineral Point and the Bank of Wisconsin; these failed, and in 1851 a new bank was started at Milwaukee. In 1854 the free banking law was adopted; since that time the progress has been as follows:—

	No.	Capital.	
1837,	2	\$119,625	
1839,	2	139,125	Suspension.
1848,			State admitted.
1854,	10	600,000	Free law.
1857,	38	2,635,000	Suspension.
1859,	98	7,995,000	Expansion.
1860,	108	7,620,000	Expansion.
1862,	70	4,397,000	Panic.

The operation of the free law, by retarding the convertibility of the bills of the Wisconsin banks, caused, when crops are short, exchange on the east to rule high, in other words depreciates the currency. The bank circulation was about \$4,600,000.

Minnesota has made, as yet, little progress in banking. It adopted the free banking law in 1858, and several banks were



started under it. In 1860 there were 17, but before May, 1862, 14 of these had failed and 2 of the remaining three did no business in the state.

Nebraska, before becoming a state, had a number of banks, chartered by the legislature, but these all went down, some in the panic of 1857 and some afterwards, and in 1862 she had not one left.

Kentucky was admitted into the Union in 1792, and in 1801 it authorized a bank, with a capital of \$150,000, under the guise of an Insurance Company, authorized to issue notes. In 1804 it chartered the Bank of Kentucky, capital \$1,000,000; this bank failed in 1814, but resumed in 1815. In 1817 a batch of forty banks, with \$10,000,000 capital, was authorized to redeem their notes by paying out Kentucky bank-notes for their instead of specie. The result was a flood of irredeemable paper, which stimulated all kinds of speculation and jobbing, and ended in a general explosion and distress within the year. To "relieve" the people, the state chartered the Commonwealth Bank, capital \$3,000,000, pledging lands south of the Tennessee river, in addition to the faith of the state, for the redemption of the bills, which creditors were required to take at par for their claims, or wait two years for their pay. The bills fell at once to fifty cents on the dollar, and which proportion of their debts creditors were thus required to lose. This gave rise to party strife, which, at the end of five years, resulted in the repeal of the law and the suppression of the paper. The United States Bank had two branches in the state, one at Lexington and one at Louisville. When, in 1833, it became evident that that institution would not be rechartered, three new banks, with branches, were authorized, capital \$7,030,000; subsequently another was started. These went into operation, but suspended in 1837, resuming in 1839 with the United States Bank, and again suspended on the final failure of that concern. In 1842, the banks again resumed, and since then the number has gradually increased, as follows:

No.	Capital.	
1819, 18	\$4,307,431	Irredeemable.
1833, 2	792,427	New charter.
1835, 4	4,106,262	With ten branches.
1837, 4	8,499,094	Suspension.
1851, 26	7,536,927	
1857, 35	10,596,205	Suspension.
1860, 45	12,835,670	Recovery.
1862, 57	15,305,500	War time.

Tennessee commenced banking in 1807, with the Bank of Nashville, which soon failed with great loss. In 1811 it again chartered ten banks, and a number of others were from time to time started, but failed disastrously. In 1852 the free banking law was adopted, and the progress of affairs to 1860 was as follows:—

No.	Capital.	
1819, 3	\$1,545,867	Disastrous failure.
1820, 1	737,817	State bank charter.
1835, 3	2,890,381	Four branches.
1837, 3	5,293,079	Suspension.
1852, 23	6,881,568	
1857, 45	9,083,693	Suspension.
1860, 34	8,067,037	

Arkansas had two banks that were started upon state bonds. These the state issued to the extent of \$3,500,000 to the banks to form their capitals. The bonds were sold through the United States Bank, and the money obtained for them was loaned out pro rata to the stockholders, who became so by filing mortgages on their plantations and lands. Speedy ruin, of course, overtook both banks. These went into liquidation, owing the state some \$3,000,000 on the bonds which were not paid. No banks were started again in Arkansas till after the war.

Mississippi is a state in which banking for a long time ran riot, but which has had but little in the last ten years. When the state came into the Union in 1817 it had one bank, which continued with an increased capital to 1830. In that year the state chartered the Planters' Bank, with a capital of \$3,000,000, two-thirds to be subscribed by the state in stock, which was issued, and the bank went into operation. Other banks were then chartered, and in 1837 there were seventeen, with eighteen branches, and a capital of \$16,760,951. In that year the Union Bank was chartered, with a capital of \$15,000,000 in state stock; of this amount \$5,000,000 was issued, and repudiated on the ground of illegality of sale, and in 1852 the people refused, by a large vote, to pay those bonds. All the banks of Mississippi failed, and there has since been but little movement, as follows:—

No.	Capital.	
1820, 1	\$900,000	
1830, 1	950,600	Capital increased.
1834, 1	2,666,805	
1837, 17	16,760,951	18 branches.
1838, 11	19,231,123	Suspension.
1840, 18	30,379,403	Failure.
1851, 1	118,460	
1859, 2	1,100,000	
1861, 0		All failed.

Missouri had one bank when it came into the Union in 1821, but it failed disastrously. The State Bank of Missouri and branches continued to be the only institution up to 1836, when a law was passed authorizing others, and the progress to 1862, was as follows:—

	No.	Branches.	Capital.	
1819,	1		\$250,000	
1837,	1	1	533,350	State bank.
1839,	1	1	1,027,870	
1857,	5	5	2,620,615	Suspension.
1859,	17	5	5,796,781	Expansion.
1860,	9	29	9,082,951	
1862,	44	—	13,884,383	

Louisiana came into the Union in 1812, with one bank, having a capital of \$500,000. This was increased to three banks in 1815, capital \$1,432,000. The progress subsequently was not great until after 1830, when the speculative spirit of those years was largely developed in Louisiana, and thence to 1860, was as follows:—

	No.	Branches.	Capital.	
1830,	3		\$4,665,980	
1837,	16	31	36,769,455	Suspension.
1840,	16	31	41,711,214	Failure.
1843,	6	22	20,929,340	Liquidation.
1851,	6	22	12,370,390	Free bank law.
1857,	6		22,800,830	Suspension.
1860,	13	—	24,496,866	

The free banking law was adopted in 1853, and four banks were started under its provisions, which required the banks to keep one third of their liabilities in specie on hand.

Alabama has had experience of a disastrous nature in state banking, and there has been little enterprise in that direction since the failure of the State Bank. When she came into the Union in 1819 she had one bank, with a capital of \$321,112. In 1830 she had two banks. It was then supposed that by embarking in banking, the state might derive profits enough to pay all the state expenses and dispense with taxation. Accordingly, state bonds were issued to form the capital of the State Bank, which however, soon failed, and the state was saddled with a debt of some \$11,000,000.

The progress was as follows:—

	No.	Capital.	
1819,	1	\$321,112	
1830,	2	781,010	
1837,	3	10,141,806	Suspension.
1840,	3	14,379,255	Liquidation.
1843,	1	1,500,000	Bank of Mobile.
1851,	1	1,500,000	Free banking law.
1857,	4	2,297,800	Suspension.
1860,	8	4,901,000	

Virginia chartered a bank as early as 1804 for 53 years, the Bank of Virginia, capital \$1,500,000, since enlarged. In 1830 there were four banks, and the change was not great down to 1851, when the free law was adopted, but the charters of the old banks were renewed as they expired. The course of events was as follows:—

	No.	Branches.	Capital.	
1819,	3		\$5,112,192	
1830,	4	18	5,571,181	
1837,	5	18	6,732,500	Suspension.
1839,	5	20	7,458,248	
1840,	6		10,363,362	
1851,	6	20	9,731,370	Free banking law.
1857,	22	40	14,651,600	Suspension.
1860,	24	41	16,005,156	

North Carolina began her bank career in 1804, in granting a charter for \$250,000 capital. From that time the number and amount of capital steadily increased, without any material deviation from a steady course, until 1860, as follows:—

	No.	Branches.	Capital.	
1810,	3		\$2,964,887	
1830,	3		3,195,000	
1837,	3	7	2,880,590	Suspension.
1850,	3	12	3,789,250	
1860,	12	18	6,526,488	

South Carolina was more variable in its banking movement. Its first institution was the State Bank. In 1820 the capital was pledged as security for the state debt, and it became a regular bank. The progress of the state to 1860 was as follows:—

	No.	Capital.	
1792,	1	\$675,000	
1711,	4	3,475,000	
1820,	3	2,474,000	
1836,	10	8,636,118	
1837,	4	4,100,000	Suspension.
1839,	11	9,153,498	Eight new charters.
1850,	14	13,179,131	
1860,	20	962,062	

Georgia had a regular supply of banks after the expiration of the first United States Bank in 1811, when she chartered an institution with \$215,000 capital. In 1820 this had increased to four banks, with a capital of \$3,401,510, and the progress to 1860, was as follows:—

	No.	Capital.	
1811,	1	\$215,000	Old U. S. Bank expired.
1816,	3	1,502,000	New " chartered.
1820,	4	3,401,510	
1833,	13	6,534,691	Deposits removed.
1837,	16	11,438,828	Suspension.
1840,	39	15,098,694	
1846,	22	8,970,789	
1857,	30	16,015,256	Suspension.
1860,	20	16,689,560	

District of Columbia banks were established as early as 1792, in the district, and increased pretty rapidly, as follows:—

	No.	Capital.
1792,	1	\$500,000
1802,	2	1,500,000
1811,	4	2,311,395
1815,	10	4,078,295
1820,	13	5,525,319
1830,	9	3,879,574
1837,	7	2,204,445
1844,	6	1,649,280

Most of the charters expired, and not being renewed, the concerns gradually went into liquidation.

Florida came into the Union in 1845, with a load of five banks that had been chartered by the territory in 1838, with an aggregate capital of \$2,113,000. These were mostly based upon \$3,500,000 territorial bonds, issued to the banks for capital, and sold in London. The concerns failed almost as soon as they got the money, and went into liquidation, when the state repudiated the bonds,

and there were no banks in Florida, until 1860, when two were started, with \$300,000 capital.

From this sketch of banking in each state, it is to be observed that the creation of banks has been due more to the desire to borrow money through their operation than to lend it. The mistaken idea that they could supply capital, was the temptation to their creation, and disastrous failure everywhere attended the experiment. Gradually a principle of sound banking vindicated itself amid numerous disasters, and actual capital came to be employed in the business.

CHAPTER III.

BANKS OF THE UNITED STATES—CLEARING HOUSES—PRIVATE BANKING.

HAVING sketched the course of events in each state, we may recapitulate the leading features of all the state banks:—

BANKS OF ALL THE UNITED STATES—TOTAL OF IMPORTS AND EXPORTS—POPULATION.

No.	Capital.	Loans.	Circulation.	Specie.	Deposits.	Imports & Exports.	Population.
791,	3	\$2,000,000	.....	.....	.....	\$18,212,041	3,929,827
800,	32	23,550,000	.....	.....	.....	162,224,548	5,305,925
811,	89	52,601,601	.....	\$28,100,000	.....	144,716,833	7,449,960
815,	208	82,259,590	.....	45,500,000	.....	165,599,027	8,353,338
816,	246	89,822,422	.....	68,000,000	.....	229,024,452	8,595,806
820,	308	137,110,611	.....	44,863,344	19,820,240	\$35,950,470	144,141,669
830,	330	145,192,268	200,451,214	61,323,898	22,114,917	55,559,928	144,726,428
837,	634	290,772,091	525,115,702	149,185,890	37,915,340	127,397,185	258,408,593
840,	901	358,442,692	462,896,523	106,968,572	33,105,155	75,686,857	239,227,465
843,	691	228,861,948	254,544,937	58,563,608	33,515,806	56,168,628	149,100,279
846,	707	196,894,309	312,114,404	105,552,427	42,012,095	96,913,070	235,180,313
854,	1,208	301,376,071	557,397,779	204,689,207	59,410,353	188,188,744	582,803,445
857,	1,416	370,834,686	684,456,889	214,778,822	58,349,838	230,351,352	723,850,823
860,	1,562	421,880,095	691,945,580	207,102,477	83,594,537	253,802,129	854,500,000
1863,	1,466	405,045,829	648,601,863	238,677,208	101,227,367	393,686,126	594,097,046
							34,478,633

This table shows the number of banks, with their aggregate capital, at important eras. As in 1791, when the national bank and mint went into operation; 1811, when the bank charter expired; 1815, when the numerous banks that had sprung into being on the dissolution of the National Bank, were all suspended; in 1816, when the peace, bringing with it large imports of goods, and a heavy drain of specie to Europe and Asia, increased the confusion and aided the re-establishment of a national bank; 1820, when that bank, in full operation, was staggering under adverse exchanges and the operation of local banks; 1830, when five years of successful working, after the revulsion of 1825, and under a high tariff, had given confidence to the public; 1837, when the rivalry between the state and the national banks

had, aided by the state of affairs in Europe, stimulated speculation, which resulted in the revulsion of that year; 1840, when the number of banks had reached the highest point, under efforts to restore prosperity by paper credits; 1843, the lowest point of depression after the failure of those efforts, and the liquidation of the unsound banks; 1846, when the bank capital was at a low point, but bank credits had begun to multiply under the effects of the famine abroad; 1854, when the gold discoveries had prompted the creation of five hundred new banks; the panic period of 1857; the partial restoration of 1860; and the contraction and general upheaval in all financial operations produced by two years of war, in 1863.

The mere figures, showing the magnitude of the bank movement, do not indicate the

changes in the manner of doing business, nor do they indicate any unsafe expansion, except as in connection with the business they represent. Thus, in 1837, the bank loans were \$525,000,000, and their circulation \$149,000,000. Events proved that those loans were of the most speculative and unsafe character. In 1860, the loans were \$691,900,000, and the circulation \$207,000,000. Yet these larger figures were very far from being excessive. They represent but \$6 circulation per head of the people, while that of 1837 was nearly \$10 per head. The imports and exports, were, in 1837, but half the amount of bank loans. In 1860 they exceeded the amount of bank loans, but in 1863 were fifty-four million less. It is thus evident, that the larger sum of bank loans represents actual business, while those of 1837 represented only speculative values. This fact of the nature of loans made is the key to sound banking. It is a matter which depends upon the judgment and skill of the banker, and it cannot be regulated by law. Hence the futility of all the laws that have been devised to prevent banks from breaking. It is to be remembered, that the bank loans form but a portion of the credits which are the great purchasing power in trade. Almost all the wholesale business of the country is done with the notes of individuals, running for a longer or less time. These are entirely independent of law or banks. In a time of great mercantile confidence and speculative activity, business men are disposed to buy on credit, and their competition for produce and merchandise causes a rise in prices. This rise stimulates greater activity, which reacts upon prices until revulsion is brought about. The agency which the banks have in this matter is to discount a portion of the notes which a dealer takes in exchange for the merchandise he sells. The bank in discounting does not actually lend any money. It merely operates a canceling of credits by book accounts. Thus, a merchant buys goods and gives his note at six months. He then deposits what money he receives in the course of business to await the maturity of the note. As the period approaches, he finds that he has not money enough, but he has in his pocket-book a number of notes that he has taken for goods. These he takes to the bank and offers as collateral security for his own note, that he offers for discount. The bank making the discount places the amount to his credit. He draws a check against that

credit in favor of the note he has to pay, and the two entries cancel each other. There has been no money used, but one kind of promise has supplanted another. As the crops come forward from the country, the drafts drawn against them pay the notes held by the merchant and lodged as collateral. Dearthness or scarcity of money in the market depends mainly upon the disposition of the banks to facilitate the canceling of credits, and in this the institution affects to be governed by the state of the foreign trade. If the disposition to buy goods has been very active and prices are consequently so high as to pay good profits on imports, the arrivals of merchandise will be large and the exports proportionably small. This involves a demand for specie which the banks avoid, by refusing to come under new obligations. A competition in curtailment sets in. The bank that curtails the most rapidly will have the balances in its favor from the other banks, and will command their specie. Each endeavors to attain such a position. The pressure becomes great, the public alarmed, and individual depositors draw their specie, which exhausts the banks, and they stop. This was the state of affairs in 1857.

The general tendency of the banks has been, under the teachings of experience, to equalize balances and to insist on prompt payment. In the case of circulation this was done in New England by the Suffolk system, and in New York and most other states by the free law, which required a deposit of state stocks of dollar for dollar of the circulation. It is obvious, however, that these regulations in no degree affect discounts and those operations where circulation is not in question; as in the checks of individuals, by which a large portion of credits are transferred. In New York city there were about 50 banks, each of which received checks on all the other banks, and had checks drawn upon it in favor of all others. There were also drafts and bills from abroad, constantly coming to each to be paid by others. Up to 1853, all the banks employed each a man to go round and collect all these checks and drafts each day, and each bank kept fifty accounts open. To obviate this and to enforce settlement, the "clearing house" was devised. By this system, each bank sends thither every day a clerk, with all the demands it has against all other banks. The fifty or sixty clerks assembled make a mutual exchange of all claims, and the balance, if any, is struck, and

each bank pays in cash the amount of that balance. The amount of accounts depends upon the activity of business. The clearing house commenced in Oct., 1853, and its operations have been as follows:—

	Amount Exchanged.	Balances Paid.
1854,	5,750,455,987	297,411,493
1856,	6,906,213,328	334,714,489
1858,	4,756,664,386	314,238,910
1860,	7,231,143,057	351,000,000
1862,	6,871,443,591	415,530,331
1864,	24,497,196,656	885,719,205
1866,	28,717,146,914	1,066,135,106
1868,	23,484,288,637	1,125,455,237
1870,	27,804,539,406	1,036,484,822

The emergencies of the war required the issue of demand notes by the Government, of small denominations to serve for circulation, as well as the putting forth of bonds, treasury notes, and loans of various kinds. At first these demand notes were the equivalent of gold and silver, and were receivable in payment of customs duties, as well as all other moneys due to the United States; but the gradual advance in the price of gold made them so valuable as to take them out of the circulation, and cause them to be hoarded as gold. Congress then authorized the issue of legal-tender notes of small denominations, receivable for the payment of all dues to the United States except customs, which must be paid in gold, the coin being needed to pay the interest on that portion of the national debt upon which interest in gold was guaranteed. Of these legal tender notes, or *greenbacks*, \$450,000,000 were issued, and on the 1st of December, 1871, there was outstanding only \$357,592,801. Beside this, Congress authorized the issue of postal and fractional currency to the extent of \$50,000,000, but the amount issued never exceeded \$45,000,000, and was, December 1, 1871, only \$40,166,036. From our brief review of the condition of the banks in the various states, from 1860 to 1863, it will be apparent that they were rapidly approaching a crisis, their issues being very generally distrusted and the discounts on them so perplexing and ruinous to the holders that every one who could, shunned them. The issue of legal-tender notes and fractional currency, while it was absolutely necessary to the existence and efficiency of the National Government, in the great war it was conducting, was seen by the great financiers who were managing the nation's finances, to be but a temporary expedient, and liable to the serious objection, as a permanent currency, of

expanding most when it should be contracted and least, when expansion was necessary. But a national currency was needed; for the people would not go back to the old uncurrent money and the mysteries of the counterfeit detectors and uncurrent money lists, the banks of the country could not issue notes which would inspire general confidence. The national banking system devised by Mr. Chase, then Secretary of the Treasury, and based in its main features upon the New York Free Banking law, though with additional safeguards for depositors and bill holders, satisfied this demand fully, and at the same time furnished a home market for \$300,000,000 or more of the bonds and Treasury notes the Government was then issuing. The capital of the National Banks consisted of these Bonds, Treasury Notes, &c., and these being deposited in the U. S. Treasury, the Controller of the currency issued to the banks, National Bank notes of different denominations (printed from the same plates, but with the name and place of the bank and the coat of arms of the state to which it belonged inserted,) to the amount of not more than ninety per cent. of the par value of the bonds. The amount of circulation was at first limited to \$300,000,000, but in July, 1870, an additional amount of \$50,000,000 was permitted. Minor modifications of the original law have been made providing for rigid and frequent inspection of the condition of each bank, redemption in New York city, and avoiding all depreciation of the notes. At first the development of the National Banks was slow, as their advantages were not appreciated, and the state and local banks made a very bitter fight against them, but Congress passed in 1865, an amendment to the Internal Revenue Law taxing the circulation of the state banks so heavily that they were glad to withdraw it from the market and most of them reorganized as National Banks, which from this time had a rapid growth.

The following Table shows the progress of the National Banks:

	Year.	No. of Banks.	Capital.	Circulation.
Oct.,	1863,	66	\$7,188,393	
"	1864,	507	86,782,802	45,260,504
"	1865,	1,513	393,157,206	171,321,903
"	1866,	1,643	415,278,969	280,129,553
"	1867,	1,643	420,073,415	293,887,941
"	1868,	1,645	420,634,511	295,769,489
"	1869,	1,617	426,399,151	293,593,645
"	1870,	1,615	430,399,301	291,798,640
"	1871,	1,784	462,518,602	322,952,030

The following Table, giving the condition in several particulars of the National Banks, Sept. 30, 1871, is of interest in this connection. It is official.

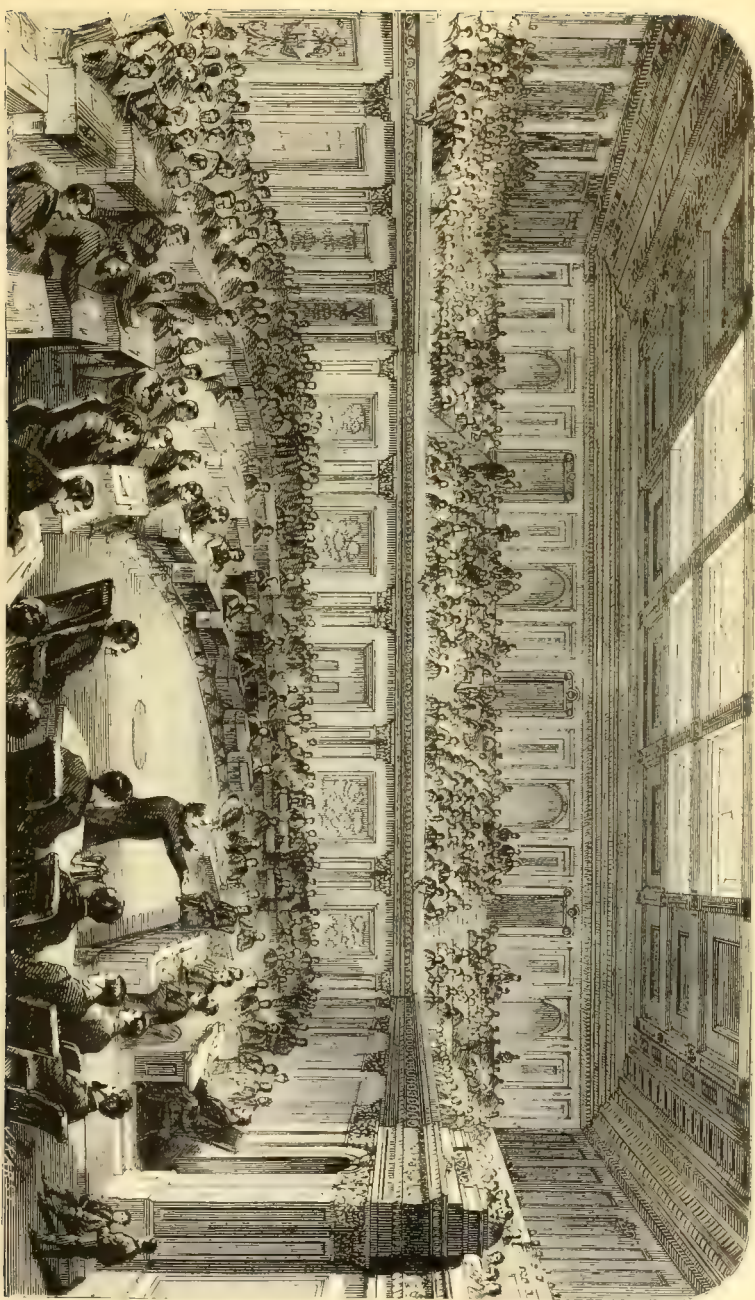
Statement showing the number of Banks, amount of capital, amount of bonds deposited, and circulation, in each State and Territory, on the 30th day of September, 1871.

States and Territories.	In operation.	Capital paid in.	Bonds on deposit.	Circulation issued.	In actual circulation.
Maine,.....	61	\$9,125,000 00	\$8,399,250	\$8,414,346	\$7,538 600.00
New Hampshire,...	42	4,889,000.00	4,919,000	4,835,845	4,341,695.00
Vermont,.....	41	7,910,012 50	7,271,400	7,191,350	6,468,720.00
Massachusetts,.....	207	88,072,000.00	65,616,750	68,233,960	57,480,866.00
Rhode Island,.....	62	20,364,800.00	14,851,400	15,081,565	13,236,805.00
Connecticut,.....	81	25,056,820.00	20,078,400	20,443,410	17,800,455.00
New York,.....	291	113,140,741.00	73,545,900	83,960,388	64,018,348.00
New Jersey,.....	57	12,580,350.00	11,371,850	11,422,575	10,032,520.00
Pennsylvania,.....	198	51,780,240 00	45,731,750	46,537,610	40,357,046.00
Maryland,.....	32	13,590,202 50	10,296,750	10,789,210	9,181,306.00
Delaware,.....	11	1,528,185.00	1,453,200	1,477,875	1,303,475.00
District of Columbia,	3	1,350,000 00	1,234,000	1,471,800	1,081,570.00
Virginia,.....	23	3,870,000.00	3,711,500	3,481,880	3,312,400.00
West Virginia,.....	17	2,621,000.00	2,504,750	2,452,540	2,175,540.00
Ohio,.....	130	24,349,700.00	21,401,400	22,357,655	19,338,976.00
Indiana,.....	75	15,032 000.00	14,333,300	14,095,465	12,524,942.00
Illinois,.....	115	17,128,000.00	15,527,200	15,245,550	13,722,825 00
Michigan,.....	61	7,263,800.00	5,896,300	5,909,210	5,310,360.00
Wisconsin,.....	41	3,400,000 00	3,314,550	3,359,650	3,083,257 00
Iowa,.....	60	4,997,750.00	4,764,000	5,146,875	4,452,999 00
Minnesota,.....	23	2,432,025.00	2,413,000	2,325,500	2,104,600.00
Kansas,.....	12	850,000.00	785,000	741,800	649,600.00
Missouri,.....	30	8,895,300.00	6,191,750	6,401,670	5,679,718.00
Kentucky,.....	29	6,168,240.60	5,625,150	5,350,510	5,071,730.00
Tennessee,.....	19	2,817,300.00	2,706,150	2,656,170	2,443,171.00
Louisiana,.....	6	3,500,000.00	2,858,000	2,813,020	2,555,489.00
Mississippi,.....	1	100,000.00	80,000	66,000	33,776.00
Nebraska,.....	5	650,000.00	640,000	581,100	561,500.00
Colorado,.....	4	400,000.00	404,000	383,490	358,990.00
Georgia,.....	10	2,384,400.00	2,156,400	2,041,300	1,942,743.00
North Carolina,....	9	1,560,000.00	1,515,100	1,385,300	1,362,300.00
South Carolina,....	7	1,895,460 00	1,380,000	1,245,340	1,240,150.00
Alabama,.....	8	916,275 00	842,150	884,100	766,783.00
Nevada,.....	1	250 000.00	100,000	146,200	72,486.00
Oregon,.....	1	250,000 00	250,000	136,000	135,000.00
Texas,.....	5	625,000.00	625,060	648,300	557,500.00
Arkansas,.....	2	200,000.00	200,000	192,500	180,000.00
Utah,.....	1	250,000.00	150,000	176,520	132,281.00
Montana,.....	1	100,000.00	100,000	90,000	90,000.00
Idaho,.....	1	100,000.00	100,000	94,300	89,500.00
Wyoming,.....	1	75,000.00	30,000	27,000	27,000.00
New Mexico,.....	1	150,000.00	150,000	135,000	135,000.00
Fractional redemption, ..					8 20
Total,.....	1,784	462,518,601.60	365,444,350	380,609,879	322,952,030.20

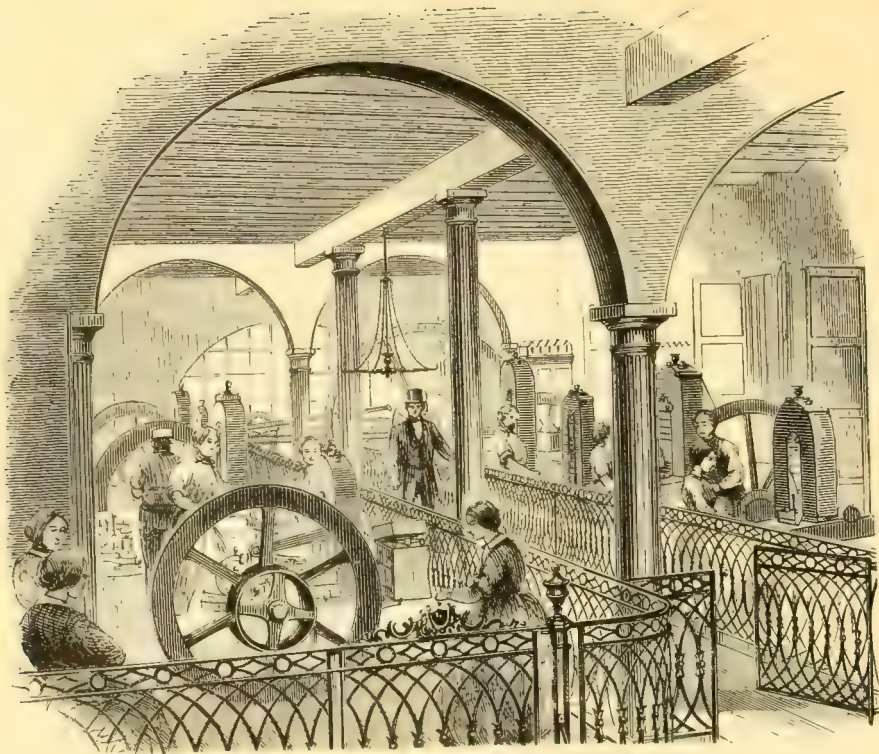
There are two National Gold Banks in existence, as follows:

Gold Banks.		Capital.	Gold on Deposit.	Gold Notes Issued.	Circulation.
Massachusetts,.....	1	300,000.00	150,000	120,000	120,000.00
California,.....	1	1,000,000.00	500,000	375,000	375,000.00
Total,.....	2	1,300,000.00	650,000	495,000	495,000.00

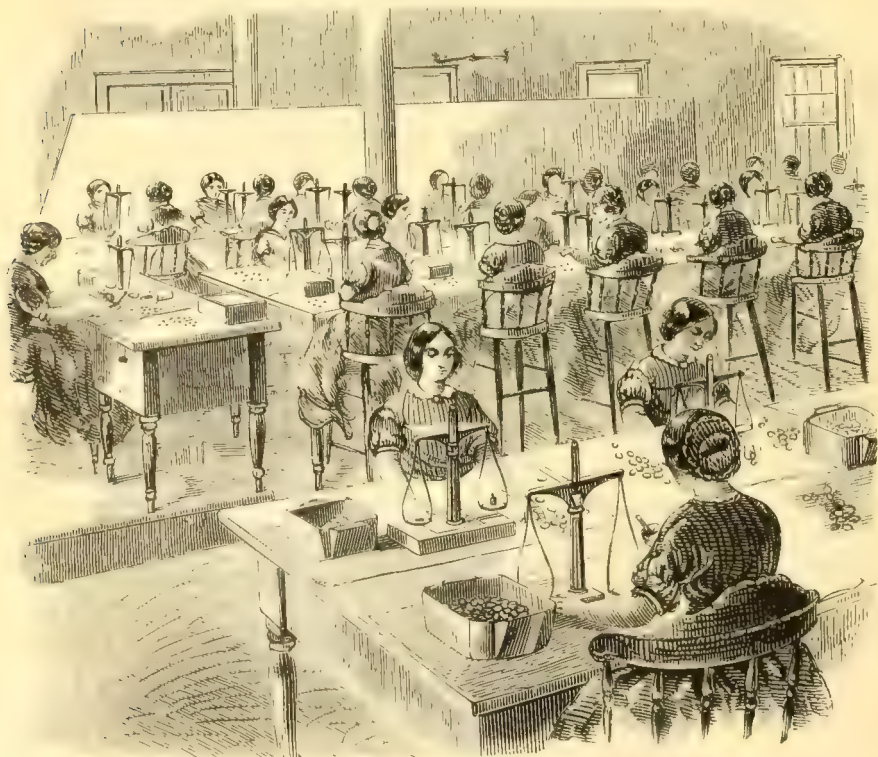
There were in the United States in May, 1871, 352 chartered banks (not National) but working under special charters. None of them were, of course, banks of circulation, but only of discount and deposit. Their aggregate capital was, at that date, about \$93,000,000. There has been also a great increase of private banking houses, and some of these having extensive foreign connections and employing a larger capital than any National bank, do an extensive business.



INTERIOR VIEW OF THE U. S. SENATE CHAMBER.



INTERIOR OF THE MINT, PHILADELPHIA COINING ROOM



INTERIOR VIEW OF THE MINT, PHILADELPHIA ADJUSTING ROOM,

UNITED STATES MINT.

CHAPTER I.

ESTABLISHMENT OF MINT—STANDARD OF COINS—LAWS REGULATING COINAGE—PROGRESS OF COINAGE—PRECIOUS METALS IN THE COUNTRY.

THE currency, or circulating medium of a country, is of itself a very simple matter, although complicated at times by the theories of financiers, and the efforts to make promises of a thing pass for the thing itself. In the early stages of society the products of industry constitute the wealth of the people, after they have ceased to be merely herdsmen. These products being exchanged against each other, the transactions form barter trade. As wealth increases and wants become more diversified, as well as the products of industry, by being subdivided, some common medium of value becomes requisite to meet all the wants of interchange. The precious metals have generally been adopted as this medium, because the supply is the most steady, the equivalent value most generally known, and the transportation most convenient. Hence all trade comes to be represented by a weight of pure gold or its equivalent of pure silver, and all commodities come to be valued, or called equivalent, to certain quantities of these metals. To ascertain the purity and weight of the metal offered in payment at each transaction would, however, involve difficulties that would neutralize the value of the metals as a common medium of exchange. Every man would require to be an assayer, and to be provided with scales. To obviate this the government steps in, and by means of a mint assays the metals, and weighs them into convenient pieces, placing on each a stamp, which soon becomes universally known, and this is called "money." Every nation makes the pieces of different weights, and puts in more or less pure metal. To ascertain the "*par*' of exchange" between two

countries, the coin of each is assayed, and the quantity of pure metal in each being ascertained, the *par* of exchange is known. When this continent was discovered, its inhabitants were savages, who had no idea of property, and no trade beyond the mere exchange of, perhaps, a skin for a bow or a bunch of arrows. Money was unknown, and the value of the precious metals was not understood. The little gold and copper that they had was twisted into rude ornaments; but no man would work for a piece of these metals. When the first emigrants landed, they commenced the cultivation of the earth and the interchange of its products. The accumulation of industrial products formed wealth. Their first exchanges were mere barter. As late as 1652 the payment of taxes and other dues was made in cattle, skins, and other products in Massachusetts; and tobacco was a medium of trade in Virginia. Some money existed, but this was mostly the coins brought by the immigrants from the mother country, and did not suffice for the daily wants. Massachusetts, therefore, established a mint for the coinage of shillings, sixpences, and threepences of sterling silver, which were "two pence in the shilling of less valew than the English coyne." This "pine tree shilling," so called from a pine tree on the reverse, was worth about twenty cents. This coinage gave umbrage to the mother country, and when Governor Winslow was introduced to Charles II., that usually good-natured monarch took him roughly to task for the presumption of the colony in assuming to coin money, at the same time producing the coin with the pine tree upon it. The ready wit of the governor, however, turned the rebuke, by assuring his Majesty that it was an evidence of the devotion of the colony, which struck these medals in commemoration of the escape of his Majesty in the Royal Oak, which was executed as well as the poor state of the arts in the colony would permit. The

coinage was nevertheless suppressed, and the example of Massachusetts was followed by Maryland with the like results. Carolina and Virginia struck some copper coins, but without much effect. There being no mint, therefore, in any of the colonies, foreign coins were circulated freely as a legal tender. The country produced none of the precious metals, but as the trade of the colonies increased, and they began to have a surplus of fish, provisions, food, tobacco, etc., beyond their own wants, to sell, they built vessels, and carried these articles, mostly fish, to the West Indies and the catholic countries of Europe; and as the mother country did not allow the colonies to buy manufactures except from herself, money was mostly had in exchange for this produce. Guineas, joes, half joes, doubloons, and pistoles of various origin constituted the gold currency, while the silver was mostly the Spanish American dollar and its fractions: the half, quarter, eighth, and sixteenth, with the pistareen and half pistareen. This silver coin flowed into the colonies from the Spanish West Indies, in exchange for fish and food; and the Spanish dollar thus came to be the best known and most generally adopted unit of money. The coin had upon its reverse the pillars of Hercules, and was known as the pillar dollar; hence the dollar mark (\$), which represents "S," for "Spanish," entwining the pillars. Inasmuch as the "balance of trade" was in favor of England, the largest portion of the coin that flowed in from other quarters was sent thither, and this tendency was increased by the pernicious issues of paper money by the colonies. This paper displaced the coin, and drove it all out of the country. The exigencies of the several colonial governments caused them to make excessive issues of this "paper" or "bills of credit," and it fell to a heavy discount as compared with coin. Not being convertible at the date of the Revolution the depreciation in the several colonies was nearly as follows:—

VALUE OF THE DOLLAR AND THE £ STERLING IN COLONIAL PAPER MONEY.

	£ sterling.			Dollar.	
	£.	s.	d.	s.	d.
New England and Virginia . . .	1	6	8	6	0
New York and North-eastern . .	1	15	6½	8	0
Middle states	1	13	4	7	6
South Carolina and Georgia . .	1	0	8½	4	8

On the formation of the new government, the terrible state of the currency first attract-

ed attention. The country had been flooded with "continental money," which had been issued to the extent of three hundred and sixty millions for war expenses. The states had issued "bills of credit," which were depreciated as in the table; and the debased and diversified foreign coins that circulated were very few in number. Private credit hardly existed. Frightful jobbing took place in the government paper, and industry could with difficulty get its proper reward. The first effort was to give the federal government alone the right to coin money, to prohibit the states from issuing any more "bills of credit," and to get the continental money out of circulation by providing for its payment. Robert Morris had been directed to report upon the mint and a system of coinage, and he did so early in 1782. Many plans were based upon his report, and finally that of Mr. Jefferson was adopted. It conformed to the decimal notation, with the Spanish dollar as the unit: A gold piece of ten dollars, to be called the eagle, with its half and quarter; a dollar in silver; a tenth of a dollar in silver; a hundredth of a dollar in copper.

In accordance with the plan of Mr. Jefferson, a law of April 2, 1792, enacted regulations for a mint, located at Philadelphia, and the coinage proceeded. It was found that, owing to the rise in the value of copper, the cent had been made too heavy, and, January 14, 1790, it was reduced to two hundred and eight grains, and January 26, 1796, it was again reduced to one hundred and sixty-eight grains, at which rate it remained until the late introduction of nickel. The mint being established at Philadelphia, the work of coinage went on slowly, for two principal reasons. The first was that the material for coin—that is, gold and silver, no matter in what shape it may be—was obtained only, by the operation of trade, from abroad, and nearly all of it arrived at New York, the property of merchants. Now, although the government charged nothing for coining, yet, to send the metal from New York to Philadelphia during the first forty years of the government, when there was none but wagon conveyance, was expensive, and accompanied with some risk. It was not, therefore, to be expected that the merchants would undertake this without any benefit; the more so, as the same law, in the second place, still allowed the foreign coins to be legal tender. The merchant who received,

say ten thousand dollars in gold coin at New York had only to lodge that coin in the local bank, and use the paper money issued by the bank. There was no necessity to send the coin to Philadelphia merely to be recoined without profit. It was also the case that in the course of the newly developed commerce between the United States and the countries of Europe, it was found that silver had been valued too high at the mint. It was coined in the ratio of fifteen to one of gold, when its real value was nearer sixteen to one. This relative value of the two metals depends upon the respective demand and supply in the markets of the world. At about the date of the discovery of America it was ten to one; that is, ten ounces of pure silver were equal to one ounce of pure gold. When Peru and Spanish America poured in their large supplies of silver, the rate gradually fell to fifteen to one. At the close of the eighteenth century, and with the greater freedom of commerce in the first half of the nineteenth century, it was found still to decline. The reason of this is obvious, since, in any locality, the relative value of the metals will be proportioned to the local supply of either, influenced by the expense of sending either to other localities. Thus, silver may have been really fourteen to one in one place, and sixteen to one in another, and the difficulties of transportation prevented an equalization. As soon as communication became prompt and cheap the equalization took place, and the general relative value was found to be somewhat changed. The effect of this was that silver came here and gold went away. Nearly all the coinage of the mint was silver. This evil attracted the attention of the government, and a remedy was sought. This was finally found in changing the relative value of the silver to gold in the coinage by simply putting less pure gold into the eagle, and letting the silver remain as it was. The quantity of pure gold in the eagle was, therefore, by the law of June 28, 1834, reduced from 247.5 grains to 232 grains, or rather more than six and five-eighths per cent, and the quantity of alloy was slightly increased, so as to make the fineness of the gold nine-tenths, or nine grains of fine gold to one of alloy in each piece.

This was found not to be exact, and in 1837 the pure gold was slightly increased, and this regulation remains. Under all

the laws the gold coins have been as follows:—

	Pure gold. Grains.	Alloy. Silver.	Copper.	Total Alloy.	Total weight. Grains.	Fine- ness.
1792,	247.5	5.62½	16.87½	22.5	270	916.7
1834,	232.0	6.50	19.50	26.0	258	899.2
1837,	232.2	6.45	19.35	25.8	258	900.0

These proportions remain now the same for gold. In order to bring the silver to the same standard, the law of 1837 reduced the alloy in dollars three and a half grains, making the dollar weigh 412 1-2 grains instead of 416.

In all this period, up to 1838, there had been but one mint, and that at Philadelphia. In 1831, under the desire of the government to enlarge the metallic basis of the national currency, three branches were authorized, one at New Orleans, one at Charlotte, North Carolina, and one at Dahlonega, Georgia. These two latter were in mining districts, where gold began to be produced to some extent, and all three went into operation in 1838. The coinage progressed down to 1853, when, in consequence of the change brought about by the gold discoveries in California, a new law in relation to the silver currency was enacted. Before giving an account of that change, we may take a table of the coinage at the mint since its organization for several periods.

UNITED STATES COINAGE.

	Gold.	Silver.	Copper and Nickel.	Total.
1792 to 1820,	7,431,545	10,790,431	421,767	18,643,743
1821 to 1834,	4,374,445	25,411,647	236,793	29,943,787
Total to 1834,	11,825,990	36,292,078	658,560	48,779,558
1834 to 1837,	11,424,650	12,560,115	117,323	24,121,888
1837 to 1848,	53,721,963	24,251,799	51,336	78,195,570
1849 to 1852,	60,211,415	6,014,507	311,297	166,567,031
1853 to 1860,	351,377,401	46,318,956	1,039,347	498,730,804
1861 to 1870,	381,240,000	18,476,710	8,473,235	410,189,985
Total,	\$871,409,161	144,012,137	11,223,038	1,226,144,838

In the first twenty-seven years of the mint operation, the gold coinage was about seventy-five per cent. of the silver coinage. That whole period embraced the European war, and the first operations of the mint were to coin as much of the metals already in the country as came within their reach. In the second period, from 1821 to 1834, the effect of the change in the relative value of the metals of which we have spoken, became manifest, and the gold coinage was about one-sixth only of the silver coinage. In 1834 the new gold bill produced a change, and the gold coinage became nearly equal to that of silver. Soon after the passage of this law, the payment of the French indem-

nity, enforced under the administration of General Jackson, took place, and it was paid in the form of gold bars, of weight varying from twenty-five to six hundred and fifty ounces each. The first of them were received at the United States mint September, 1834, and from that date to September, 1838, six hundred of these bars were deposited at the mint; the value was \$3,500,000. In 1838 the branches came into operation, and the coinage was increased by their operations and by 13,705,250 of gold of domestic production, to the close of 1848. In 1849 California gold began to make its appearance, and \$7,079,144 worth of it was coined in that year. The great influx of gold bullion upon the mint by far exceeded its capacity to do the work, and Congress authorized, by the act of March 3d, 1849, the coinage of double eagles, or \$20 pieces, and also one dollar pieces to supply the place of the silver coin, which had been drained off to California in exchange for the gold, which sold as low as \$15 and \$16 per ounce, although worth \$20 and \$21. The law of May, 1852, authorized the coinage of \$3 pieces.

In ten years, to the close of 1848, the gold coinage had amounted to double the silver coinage, and the new influx of gold excited fears that the value of silver would rise rapidly as compared with gold. From 1848 to 1857 the coinage of silver was very small, while the demand for it was large. To avoid inconvenience from this cause, a new bill was passed, to take effect April 1st, 1853. By this bill it was enacted that gold or silver deposited with the mint, might be cast into bars or ingots of pure metal, or standard fineness, at the option of the depositor, with a stamp designating the weight and fineness; no pieces less than ten ounces shall be other than of standard fineness; the charge for this is one-half per cent. Inasmuch as most of the gold arrives at New York, efforts were made to procure the establishment of a mint at that point. Instead, however, of a mint, an assay office was established there, and a branch mint at San Francisco, in 1854. The law allows the depositor to draw either bars or coin in return, the description desired to be stated at the time of the deposit. The production of bars and coins under all these regulations has been large, for gold as well as silver.

Until the law of 1834, the quantity of gold coin in circulation was not large. The

banks supplied so large a quantity of small bills as to fill the channels of circulation for sums above a dollar, and under that amount the circulation was almost altogether small Spanish coins, which, being much depreciated by wear and tear, passed for more than their intrinsic value, and consequently flooded the country, greatly influencing retail prices. This was particularly the case with the pistareens, which, up to 1827, were taken at twenty cents, or five to the dollar, although they were really worth but eighteen and a half cents, consequently there was little other change to be had. In consequence of a report of the Mint Director of that year, they were refused at more than seventeen cents, and they very speedily disappeared from circulation, and have not now been seen for more than 35 years. The quarters continued to circulate at twenty-five cents, although the average value was twenty-three and a half cents; the eighths were taken at twelve and a half, although they were worth only eleven and one-eighth; the sixteenth was taken at six and a quarter, although worth but five cents. It resulted that these coins became very abundant, driving out the dimes and half dimes, and in 1843 the post-office and the banks refusing them altogether, they were supplanted by the American coin, until the gold discoveries of 1848. After that event, owing to the increased production of gold, and the fact that some of the European states changed their monetary policy, making silver the sole standard of value, the latter metal became worth more in market than its nominal value in United States coin, and was gradually withdrawn from the currency, until, in 1852, silver coin became very scarce, and there was not sufficient left in circulation for the purposes of change. A premium of four per cent. was paid for dollars and half dollars for export, and the smaller coins commanded, in many cases, a still higher price, for use among shop-keepers and small traders. It was easy to see that, unless the weight of our silver coin was reduced, there would soon be none left in the country. Already the eating-houses and drinking saloons had issued their tickets, or shinplaster tokens, in place of coin; and the poor, who purchased the necessities of life in small amounts, were put to great inconvenience, or obliged to submit to ruinous shaves upon their paper money. To remedy these evils, Congress passed the act of February 21st, 1853 (to

take effect the 1st of April following), authorizing the coinage of half dollars, quarter dollars, dimes, and half dimes, weighing less than the old coin, as follows :

	Old coin.	New coin.
Half dollar, grains.	206 $\frac{1}{8}$	192
Quarter dollar, do.	103 $\frac{1}{8}$	96
1 dime, do.	41 $\frac{1}{4}$	38 2 5
Half dime, do.	20 $\frac{3}{8}$	19 1-5

The dollar was not changed, and the weight of that piece is 412 1-2 grains, the weight which it has borne since 1836; this

reduction of weight being fourteen and a half grains in the half dollar, or nearly seven per cent. The silver currency was not *debased*, in the ordinary sense of the word, the same fineness (nine hundred parts pure silver, and one hundred of alloy) being retained, and the only change in the coin itself being in the weight. A very important provision, however, was made in regard to it; it is not a legal tender in payment of debts in sums exceeding five dollars.

The quantity of silver coined at the mint and branches, under the law of 1853, to 1870, has been as follows :—

	Philadelphia. Pieces.	New Orleans. Pieces.	S. Francisco. Pieces.	Total pieces.	Value.
Dollars.	1,621,000	875,000	20,000	2,516,000	2,516,000
Half dollars.	14,323,130	12,566,000	11,163,450	38,052,580	19,026,290
Quarter dollars.	23,089,430	2,348,000	1,509,400	26,946,830	6,736,709
Dimes.	7,236,380	2,350,000	2,160,750	11,747,130	1,174,713
Half dimes.	13,826,130	4,660,000	1,060,000	19,546,130	977,306
3 cent pieces.	4,222,230	720,000	.....	4,942,000	148,260
	64,318,300	23,519,000	15,913,600	103,750,670	\$30,579,278

In addition to this small silver coin, there has been coined since 1849, \$18,900,000 in one dollar gold pieces. These were never, however, a popular coin.

The main source of supply of the precious metals to the mint was, before 1849, from abroad, through the operations of commerce, though the Southern States furnished almost fifteen millions. Since that time, the Pacific slope has been the leading source. The quantity of domestic gold deposited at the mint has been as follows :—

DEPOSITS OF DOMESTIC GOLD AT MINT AND BRANCHES.

	To 1851.	1851 to 1859.	To 1870.
Virginia, ...	1,197,338	327,977	1,615,736
N. Carolina, ...	6,707,458	2,236,951	9,684,622
S. Carolina, ...	817,692	462,913	1,371,384
Georgia, ...	6,018,603	782,270	7,151,236
Tennessee, ...	76,574	4,337	81,530
Alabama, ...	186,627	10,131	206,041
New Mexico, ...	38,963	9,709	523,133
California, ...	31,838,079	419,472,761	630,575,666
Kansas, ...		4,172	5,008
Oregon, ...		69,272	10,738,134
Other places, ...	41,103	33,121	106,596,699

Total, \$46,922,437 \$423,418,614 \$768,019,189

Of this large amount, \$721,096,752 of gold deposited at the mint and its branches in the 20 years, 1851–1870, about \$236,000,000 was cast into bars, and exported, together with the surplus of coin, to Europe, as merchandise. The domestic silver supplied to the mint and branches amounted in all to \$12,558,244 up to June 30, 1870. The

largest amount, almost one-half, was parted from domestic gold, and \$767,448 was from fine bars privately assayed. Nevada furnished almost \$5,000,000.

The amount of specie actually in the country cannot be ascertained with perfect accuracy. The amount in the country in 1821 was estimated at \$37,000,000. The calculation, then, up to 1849, upon official figures, would be as follows :—

Specie in the country in 1821,	\$37,000,000
Product of U. S. mines to 1849,	13,811,206

Imported 1821 to 1849,	242,239,061	50,811,206
Exported “ “	180,596,664	61,642,397

Specie in the country in 1849,	\$112,453,603
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Of this amount, \$43,619,000 was in the banks and \$5,700,925 in the federal treasury; \$32,133,688 was probably in circulation, and \$31,000,000 in plate and ornaments. From 1849 to 1859 the amount was as follows :—

In the country in 1849,	\$112,453,603
Coinage, 1849 to 1859,	529,619,919

Supply to 1859,	\$642,073,522
Import of the metals, 1849 to 1859,	78,838,864
Export in the same time,	435,023,906

Excess export,	356,185,042
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In the country in 1859,	\$285,888,480
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This gives an increase of \$173,434,877 of specie in the country to 1860. The distribution of this money was, nearly as follows :

Stock in the country,	\$285,888,480
United States treasury,	\$10,000,000
In all the banks,	101,537,818
In plate, ornaments, &c.,	50,000,000
In general circulation	121,350,662
	\$285,888,480

Immigrants bring with them large sums of coin and bullion which go either to the mint or the brokers for export. We may now ascertain the amount of money that circulated in the country in 1859, as follows :—

	1849.	1859.
Less notes on hand	16,427,000	18 838,289
Bank notes in circulat'n,	112,079,000	174,448,529
Specie in circulation,	32,133,688	121,350,662
Total mixed circulat'n,	\$144,212,688	\$295,799,191

From 1859 to 1870 some new elements entered into the calculation. The suspension of specie payments in 1861, led to hoarding and the disuse of specie in circulation, but the amount of gold and silver in the country was very nearly as follows :—

Specie in the country in 1859,.....	\$285,888,480
Accession from 1859 to 1870,.....	836,452,754
	\$1,122,341,234
Less export 1859 to 1870,.....	582,074,940
	\$546,266,294

Of this large amount, the United States Treasury held—

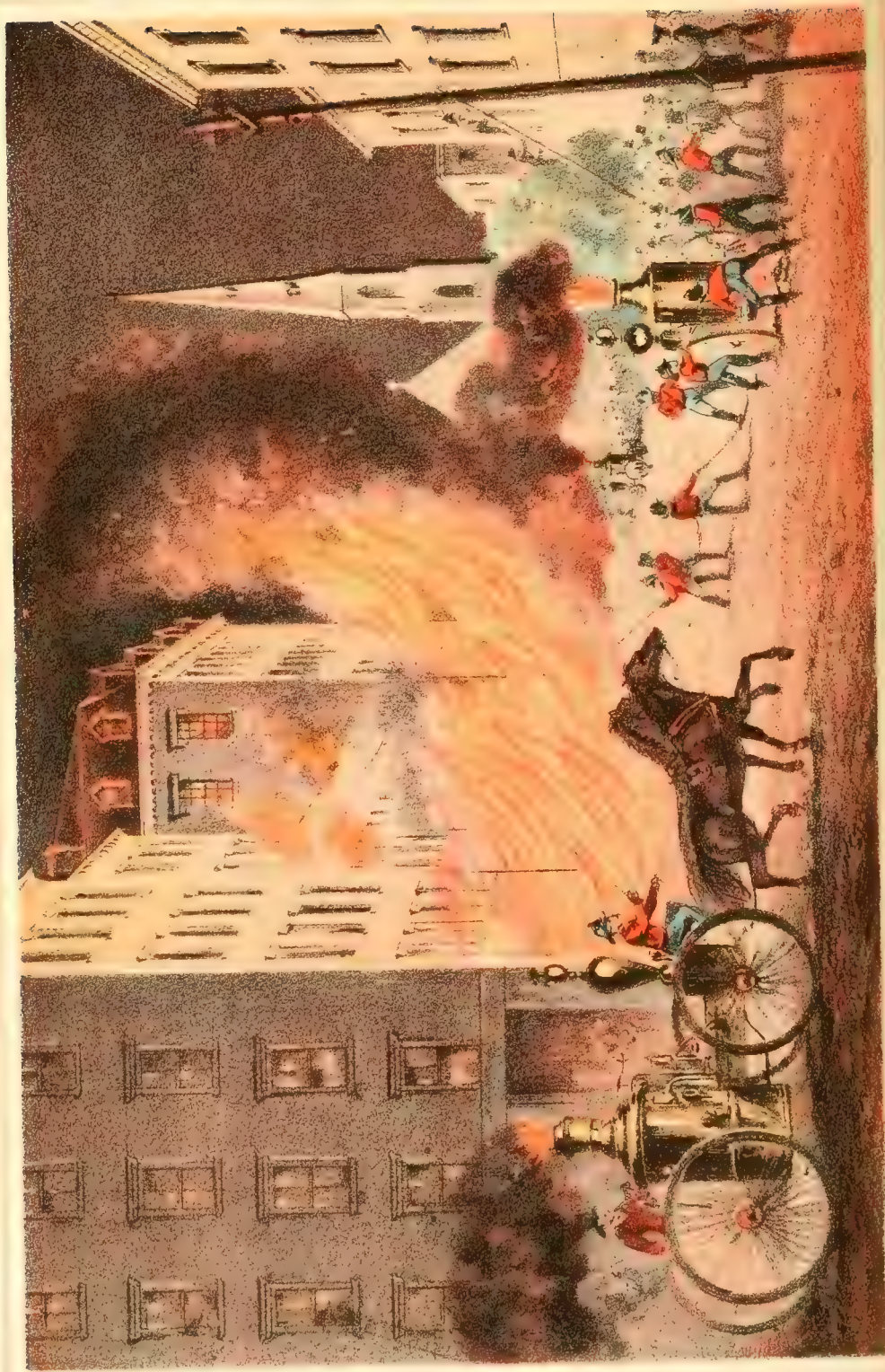
At the end of 1870,.....	\$107,802,280
The National Banks held.....	26,307,251
State banks and private banks about	104,000,000
Gold brokers and speculators,.....	25,000,000
Plate, watches, ornaments, &c.,.....	150,000,000
Hoarded,.....	127,140,000
	\$540,259,531

There was at this time, (Dec. 1870) of course no specie in general circulation, except the nickel and silver five and three cent pieces, and the copper cents and two cent pieces, and these did not exceed \$4,000,000 or \$5,000,000 in value. The circulating medium consisted of—

Legal tender notes, (greenbacks)....	\$356,101,086
Fractional currency,.....	39,995,089
Gold certificates of deposit,.....	26,149,000
National Bank Notes,.....	296,205,446
	\$718,450,621

The mint operates upon the various forms of the metals brought to it, and these are of great variety, from the most delicate plates

and ornaments down to base alloys, and these are all included under the general term bullion, except United States coins. The bullion is either unwrought or manufactured. The first description embraces gold dust, amalgamated cakes and balls, laminated gold, melted bars and cakes. The "dust" is the shape in which it is derived by washing in the placer mines. In South America, Russia, and elsewhere, amalgamated gold is that which has been procured by the use of quicksilver, forming a lump. Laminated gold is that which is combined with silver, and derived mostly from Central America. Both these kinds come to the mint in bars and cakes three inches wide, and one and a half thick, weighing 275 ounces, and are worth \$5,900. The manufactured is mostly jewelry, plate, and coin. Jewelry is received at the mint in every variety of article into the manufacture of which gold enters. Its value depends upon the quantity of pure gold in it, and this requires to be extracted by assaying. The range of fineness of the better kinds of jewelry is 300 to 600, or from 13 to 23 the value of coin of the same weight, but the cheaper kinds contain very little gold. All this mass of metal must be reduced to a uniform material, containing the proper proportion of alloy, and cast in bars, 12 in. long, $\frac{1}{2}$ in. thick, and from 1 to $1\frac{1}{2}$ in breadth, according to the size of the coin to be struck. These are tested to see if they are of the legal fineness. They are then annealed, and rolled into long thin strips by means of a steam engine. These strips are then drawn through plates of the hardest steel, to proper thickness, and by a steam press cut into "planchets" or pieces of the exact size of the coin wanted, at the rate of 160 per minute. These are then cleaned, annealed, whitened, weighed, and placed in a tube, which slides them one by one into a steel collar, in which they fit. The piece is seized, stamped with perfect impressions on both sides by the dies, and instantly pushed away to be followed by another piece. The devices on these dies are first cut in soft steel. This "original die" is then hardened, and is used to impress a piece of soft steel, which is then like a coin with the figures raised, and is called a "nub." This being again hardened, is used to impress the dies, with which the coining is done, and a pair of them will do two weeks' work. The coining presses are of sizes proportionate to the work.



INSURANCE---FIRE AND MARINE.

THE history of Fire Insurance dates back only to the year following the Great Fire in London in 1666, if indeed it can be said to have had any clearly defined existence before the year 1696, when the first organized association was formed, based upon the simple principle of contribution in the shape of annual premiums proportionate to the amount of property insured, to a common fund, out of which the losses of its various members were to be made good. This association was very appropriately styled the "Hand in Hand, or Amicable Contribution Society," and was strictly mutual in character. A number of attempts had been made for some system of Fire Insurance as early as 1669, all of which proved abortive, as did the attempt of the City of London in 1681 to settle lands and ground rents to the value of £100,000, together with the sums to be received for premiums, as a fund for the insurance of houses. About the year 1670 a company was established in Edinburgh for friendly insurance against fire, consisting of a number of private contributors, who agreed to insure each other. This insurance, however, was not personal, like modern fire insurance, but the interest, and stock, and benefit were inseparably annexed to the houses insured as long as the contribution was continued. Little progress was made under any of these forms before the commencement of the eighteenth century, when the Sun Fire Office in London was established in 1710, from which time Fire Insurance may be said to date its progress under the form of both mutual and stock companies. The limited experience obtained up to that time, had given some general notions as to hazards of different classes of property, and by enabling a proper rate to be fixed proportionate to the hazard, had so far reduced the rates charged as to render insurance easily obtainable and popular. From this time companies multiplied in England, and previous to the war of our revolution had numerous agencies in the then Colonies. In other countries of Europe the practice of insuring against fire was not introduced until a much later period, about 1754, when the

marine companies in Paris obtained permission from the government to make insurances against fire. For a long time the practice was by no means general. Owing to the solid structure of their buildings and the extraordinary caution on the part of the people for the prevention of fires, few sought protection by means of insurance. It has been confidently asserted by persons well acquainted with both the cities of London and Amsterdam, that after making all fair allowances there is upon an average more property destroyed by fire in the former in one year than in the latter in twenty. Fire Insurance has, however, now become very general, and some of the continental companies are the largest and strongest in the world.

The first Fire Insurance Company organized in the United States was the "Philadelphia Contributionship for insuring houses from loss by fire," in 1752. This was purely a mutual company, requiring a deposit from the insured, the interest of which would meet the losses of each year and yield something over for a dividend at the termination of the risk, which was for seven years. The plan was borrowed from the first English company of similar name, and the company numbered among its directors Dr. Franklin and other men eminent in colonial and revolutionary times. For many years after the peace of 1783, an insurance company, on the principle of the ancient London "Hand in Hand," existed in New York, and continued to do a moderate business until incorporated companies with capital stock became common and superseded the mutual plan, which was found to be too slow and cumbersome for the growing business of that city. The first stock company formed in the United States was the Insurance Company of North America in Philadelphia in 1794. Others followed in Providence, Boston, and New York from that time until a few years after the beginning of the present century, when Fire Insurance in this country may be said to have been established on essentially the same general principles as at present conducted. The first quarter of this cen-

tury witnessed a moderate growth; the second quarter made some progress, notwithstanding the two great fires, and ended with a moderate increase in capital and business. The extensive and enormous development of fire insurance in this country has been the work of the last twenty-five years, during which time a radical change has been wrought in the mode of doing the business by stock companies instead of mutual, and by the present wide spread and almost universal system of agencies.

In 1833, previous to which we have no reliable statistical information, there were in the City of New York some eighteen Fire Insurance Companies, with an aggregate capital of a little over \$6,000,000, one of which had a capital of \$1,000,000, and three others had \$500,000 each, while the remaining capitals ranged from \$200,000 to \$350,000. It would be interesting to know the exact amount of premiums annually received by these companies at that date, but having no reliable statistics to refer to, an approximate estimate can only be formed, based upon the recollection of parties who were then connected with certain of those institutions. From the last data of this kind now available it is ascertained quite satisfactorily that the whole amount of premiums received by all the companies in that and the two following years respectively, was something less than \$1,000,000. At that time there were no agencies of companies of other states, or foreign companies, in the State of New York, the English companies having been excluded by a law passed March, 1814. From 1833 to December, 1835, seven new companies were organized, with an aggregate capital of about \$1,700,000, making the entire fire insurance capital at the time of the great fire in December of the latter year a little less than \$8,000,000. The great fire of 1835, which destroyed about six hundred buildings, mostly stores and warehouses, and property to the value of between \$15,000,000 and \$20,000,000, caused the insolvency of all but seven of the companies then in existence in that city, thus reducing the actual capital for fire insurance to about \$1,000,000. The insolvent companies paid variously from 40 to 90 per cent. on the claims for losses under their policies. During the next ten years many of the companies were revived under favorable legislation and new companies organized, so that the fire insurance

capital of New York and Brooklyn amounted to about \$6,000,000; to which should be added a considerable number of mutual companies and agencies of Hartford and Boston companies, which were then established for the first time to any considerable extent in that city. The great fire of July, 1845, swept most of these mutuals and again several of the stock companies into insolvency, and left a large number with capitals seriously impaired. Of the companies rendered insolvent by this last calamity, none ever revived. From this time there was little increase in companies or capital until the passage of the general insurance law by the State of New York in 1849, under which, and the law of 1853, which took its place, a very large number of the companies were organized in the City of New York, thus bringing the aggregate fire insurance capital of the state at the end of 1870 up to over twenty-nine millions of dollars, again, however, reduced at the end of 1871 to a trifle over twenty-two millions by the great fire at Chicago. The progress of fire insurance in the City of New York may be taken as a fair criterion by which to judge of its progress in other prominent cities of our country. Philadelphia and Boston have not experienced such sudden fluctuations in capital as New York, having escaped fires of magnitude like those of 1835 and 1845. The older companies in both cities have been noted for solidity and conservatism. To Hartford belongs the credit of originating and giving vitality to the agency system in fire insurance. For a time, indeed, that city had almost a monopoly of the agency fire business, and is now second to none in the country in the character, position, and financial strength of its companies. The business has proved a source of wealth to that city, and it now has more insurance capital in proportion to its size than any other city in the country. Within the past fifteen years a great number of companies have been started in the prominent cities of the west, with more or less success. Such as have been organized with actual capital and prudently managed have generally succeeded, with the exception of the Chicago companies, which were engulfed in the terrible disaster of October, 1871. The past thirty years have witnessed the rise and extinction of hundreds of mutual and stock companies of purely speculative character, which never

deserved public confidence, and soon met the fate which always attends corporations organized with fraudulent purpose or managed by incompetent men. To one of these causes may be attributed the failure of nearly all the companies which have gone down during that time, except such as have been overwhelmed in one or the other of the three great fires already referred to. Many strong and well managed companies have been swept away before the great cyclones of fire which have more than once marked the history of the past forty years, and in yielding to inevitable and unavoidable calamity have secured the commendation rather than censure of the public; while such corporations, whether mutual or stock, as have been conceived in fraud and designed to prey upon the credulity or ignorance of the assured deserve only contempt and the severest punishment of the managers through whom such vast injury has been done to the insuring public.

Of this class of companies, those of a mutual character have been most noticeable for the injury which has been inflicted on the insured and the disrepute into which the business of fire insurance was brought in the ten years following 1850. Under the general insurance law of 1849 a large number of mutual companies were organized in the State of New York, and in 1853 numbered 62, with nominal assets in excess of eleven and a half millions of dollars. In 1860 the number had fallen to 27, with assets less than four and a quarter millions, and in 1870 only eight companies were in existence, with assets of about two and a quarter millions. In the State of New York the system of mutual insurance has proved a signal failure. In Massachusetts, at the close of 1849, sixty mutual companies were in existence, and at the close of 1868 the number had been reduced to 54, with gross assets of \$3,990,367.66, and outstanding risks to the amount of \$307,063,988.05. Most of these are located in the interior of the state, and are so small as to make the policies of comparatively little value, since, to pay losses, assessments are required, and these, if of any considerable magnitude, are fatal to the standing of the companies. The mutual system in Massachusetts is adapted only to the immediate locality of the companies, and seems to be gradually following the fate of the system in New York, as will

be noticed in the fact that the entire premium receipts of all the mutual fire insurance companies in that state do not exceed one-third of those of the *Ætna* of Hartford, or one-half those of the Home of New York, while the premiums of nearly a dozen stock companies separately equal the entire aggregate. In Vermont the system has been tried for more than forty years by the Vermont Mutual with better results, owing to the excellent management of the company, and the fact that its business has ever been confined exclusively to risks in that state. In other states of the Union mutual companies have shared the same fate as those of New York, and it would seem that the system, as such, is totally inadequate to the growing demands of trade and the increasing value of property to be insured.

It is a noticeable fact that in 1837 there were 48 joint stock companies in Massachusetts, with a combined capital of \$9,415,000, while in 1868 there were only 29 companies, with a capital stock of \$6,934,800. Comparing, however, the *business* of the companies, it will be found that the 48 companies in 1837 were insuring fire and marine risks to the amount of only \$140,000,000, while the 29 companies in 1868 had \$330,000,000 at risk. The increase of risks assumed in that state by companies from other states for the 16 years previous to 1869, was even more marked than that of the state companies, having risen from \$6,373,000 in 1852 to \$250,000,000 in 1868. The development of the joint stock plan of fire insurance in the State of New York has been equally remarkable. In 1844 there were 20 companies, having an aggregate capital of \$5,710,000, with amount insured \$119,571,000, while in 1870 the number had increased to 105, with an aggregate capital of 29,761,232, and amount insured \$2,813,983,769. The number of companies in the state at the end of 1871 was reduced by the great fire at Chicago to 84, with capital of \$22,307,010, and amount of risks covered \$2,397,339.63. It may be proper to note in this connection the increase of capital in companies from other states doing business in the State of New York from \$12,351,315 with \$567,887,673 at risk in 1859, to \$22,971,101 for capital in 1870, with risks \$1,695,633,560.

The following table, compiled from official reports of companies doing business in

the State of New York from 1859 to 1871 inclusive, shows the increase of capital invested in the business of fire insurance during that time, and the amount of dividends declared from year to year, with the yearly percentage and the average percentage for the whole period.

YEAR.	CAPITAL.	DIVIDENDS.	PERCENTAGE.
1859	\$32,358,315	\$4,595,350.74	14.19
1860	19,998,760	3,835,141.97	12.73
1861	29,384,260	3,250,749.76	10.06
1862	29,834,260	3,324,566.01	11.11
1863	32,246,760	3,567,331.51	10.72
1864	41,629,945	4,141,374.42	9.94
1865	44,282,750	4,616,607.11	10.42
1866	44,410,350	3,339,250.70	7.81
1867	45,611,232	3,774,326.96	8.27
1868	49,331,134	5,051,790.38	10.24
1869	51,118,602	6,252,779.39	12.53
1870	52,732,333	6,509,998.68	12.34
1871	43,857,010	4,834,880.00	11.02
Aggregate,	\$527,795,771	\$57,125,153.63	10.82

This table embraces a very large proportion of all the American companies, as nearly all fire companies seek to do business in the State of New York, and in order to do so have to make annual reports, which form the basis of this table. As near as can be ascertained the entire fire insurance capital of the country at the close of 1870 amounted to \$65,000,000. It will be noticed that the average dividends on this enormous amount of capital has been less than 11 per cent. during the past thirteen years. If the loss of capital itself during that time be taken into account, it is doubtful if the average dividends would amount to nine per cent., a figure by no means unreasonable for income on capital subjected to such fearful hazards as those of fire insurance. It is fair to assume that the capital of all the companies not reporting to the New York Department has yielded about the same average dividends, and as the capital would of itself earn at least seven per cent., there remains only about two per cent. for the profits of the business, as such, a figure quite insignificant in view of the nature of the business and the risk assumed.

It may be interesting to note the increase in the amount of premiums received, and the fluctuations in the amount of losses, with the various yearly percentage of losses to premiums, as will appear by the following table, showing the same for the past thirteen years, compiled from official sources

and embracing the same companies as the foregoing table.

YEAR.	FIRE PREM. REC'D.	FIRE LOSSES PAID.	PER CENT.
1859	\$14,413,458.56	\$8,031,247.41	55.72
1860	11,866,548.45	6,993,630.90	58.93
1861	10,527,327.76	6,249,689.79	59.35
1862	11,308,418.99	7,056,731.57	62.40
1863	14,019,658.13	5,656,975.64	40.35
1864	20,141,152.68	11,356,624.97	56.38
1865	25,419,589.55	17,264,618.33	67.91
1866	32,281,404.76	23,913,745.87	74.07
1867	36,162,138.45	20,818,269.87	57.56
1868	37,395,740.25	19,283,979.11	51.56
1869	39,353,578.57	20,054,341.80	50.95
1870	37,237,621.73	21,869,440.75	58.72
1871	38,984,570.00	31,504,180.00	85.18
Aggregate,	\$327,111,207.88	\$200,053,476.01	61.15

Thus it will be seen that the leading American fire companies lost over 61 per cent. of their premium receipts from 1859 to 1871 inclusive.

It is proper to remark that the New York Report for 1867, embracing the New York Companies doing Fire, Inland, and Marine business from 1848 to 1866 inclusive, gives over 63 per cent. of losses to premiums for that period; while the strictly mutual state companies from 1853 to 1867 inclusive suffered a loss of over 61 per cent. The fire companies in Massachusetts from 1858 to 1866 inclusive paid for losses 67 per cent., and companies from other states, doing fire business in that state, over 59 per cent. for the same period, or an aggregate loss on both classes of companies of over 60 per cent. The great fire at Chicago increased the general average of the last thirteen years at least one per cent. above the normal average. It will therefore be safe to assume 60 per cent. as the average for the last thirty or forty years of fire losses in this country to premium receipts.

The expenses of management form an important item in the history of fire insurance, and have not only exercised a great influence on the profitability of the business but also on the character of the business done. The increase of the commission to brokers and agents in 1865 from ten to fifteen per cent., no doubt had a bad influence on the general conduct of the business, aside from the increased losses on risks influenced by the increased commission.

The following table shows the cash premiums received and expenses paid, with average percentage for time named:

YEAR.	NET CASH PREM'S RECEIVED, IN- CLUDING INLAND.	EXPEND'S, LESS DIVD'S, LOSSES, AND AMOUNT PAID IN INTEREST ON SCRIP AND REDEMPTION.	PER CENT.
1859	\$14,535,112.94	\$4,004,557.39	27.55
1860	13,750,762.49	3,741,323.86	27.20
1861	12,400,645.09	3,484,593.73	28.10
1862	13,404,597.62	3,569,905.98	26.63
1863	16,414,233.94	4,500,850.50	27.42
1864	23,843,521.89	6,861,790.25	28.77
1865	29,519,092.28	9,408,134.28	31.85
1866	38,847,492.27	11,791,369.65	30.33
1867	42,234,059.38	13,124,292.14	31.07
1868	43,023,947.81	13,874,810.99	32.24
1869	45,024,145.51	14,924,366.16	33.14
1870	42,593,085.68	15,128,290.66	35.51
1871	40,518,312.00	10,879,392.00	26.65
Aggregate.	\$376,430,998.90	\$115,288,677.60	30.62

From this table it appears that the average expenses of American Companies is not less than 30 per cent. of the premiums received. This figure, however, includes taxes on capital, which in most of the states are paid by the companies. The expenses of companies in England average about 31 per cent.; those of France about the same, while those of Germany average about thirty per cent. If, therefore, we assume thirty per cent., in round numbers, as the average expense of conducting the business, we shall not be far from the absolute figure. Com-

bining the ratio of losses with that of expenses, we find a margin of only one-tenth of the premium received for *profit, loss of capital, sweeping conflagrations, and epidemic periods*. How far this can be trifled with by ignorance or credulity the public mind must judge for itself. To the intelligent and prudent property-holder these figures are full of meaning and admonition.

Thus far attention has been directed to the profits of underwriting and only inferentially to the adjustment of rates to hazards. The comparison of losses and expenses with premiums will go far towards enabling the practical underwriter to form a correct judgment, in view of past rates and experience, on individual risks; but to the political economist it is of first importance to know the absolute relation between losses and amount of property insured, the actual amount of risks assumed to each dollar of loss, and the average rate of premium on risks written, as affording some safe criterion of judgment as to the aspect of the business as a whole. With this view the following table has been prepared, embracing twelve years, from 1860 to 1871 inclusive:

YEAR.	FIRE RISKS WRITTEN.	FIRE PREMIUMS RECEIVED.	FIRE LOSSES PAID.	Percentage of Fire Losses to Prem's.	Percentage of Fire Losses to Fire Risks written.	Am't of Fire Risks written to \$100 Loss.	Average Rate of Prem's on Fire Risks.
1860	\$1,617,439,267	\$11,866,548.45	\$6,993,630.90	58.93	.4323	231.27	.7336
1861	1,530,019,235	10,527,327.76	6,249,689.79	59.36	.4084	244.81	.6880
1862	1,729,988,571	11,308,418.99	7,056,731.57	62.40	.4079	245.15	.6536
1863	2,150,200,798	14,019,658.13	5,656,975.64	40.35	.2630	380.09	.6520
1864	3,166,532,904	20,141,152.68	11,356,624.97	56.38	.3586	278.82	.6360
1865	3,428,105,224	25,419,589.55	17,264,618.33	67.91	.5036	198.56	.7415
1866	3,930,048,321	32,281,404.76	23,913,745.87	74.07	.6084	164.34	.8213
1867	3,812,294,907	36,162,138.45	20,818,269.87	57.56	.5460	183.12	.9485
1868	4,169,495,474	37,395,740.25	19,283,979.11	51.56	.4625	216.21	.8968
1869	4,454,808,663	39,353,578.57	20,054,341.80	50.95	.4501	222.13	.8833
1870	4,509,617,329	37,237,621.73	21,869,440.75	58.72	.4849	206.20	.8257
1871	4,204,798,338	36,984,570.00	31,504,180.00	85.18	.7492	133.46	.8795
Aggregate.	\$38,703,349,031	\$312,697,749.32	\$192,022,228.60	61.40	.4961	201.55	.8079

During these eventful twelve years the amount insured has more than doubled, having reached in 1870 more than four thousand five hundred millions of dollars. The gross premiums have more than tripled, having risen from less than twelve millions in 1860 to nearly thirty-seven millions in 1871. The losses also increased from less than seven millions in 1860 to more than twenty-one millions in 1870, and more than thirty-one millions in 1871, including losses paid at

Chicago. The most alarming feature is, however, found in the enormous increase of the percentage of losses to amount insured from .4323 to .4849 in 1870, or .7492 in 1871, including the Chicago fire, or a general average for the twelve years of .4961. This fact is full of meaning, and shows that the losses by fire have more than doubled in that time, a fact well calculated to call attention to the causes which have produced, in so short a time, so fearful an increase in

the destruction of property in this country by fire. When it is considered that every loss of property by fire, whether insured or not, is a loss to the common wealth of the country, the import of these figures will be more fully appreciated. So great, indeed, has become the destruction of property by fire, that it has been doubted even by wise and intelligent persons whether, in a general or national point of view, the benefits resulting from insurance are not more than counterbalanced by the mischief it occasions. The objections in that point of view which have been urged are, carelessness and inattention which security by insurance naturally creates, and the temptation to arson engendered by it. But though it must be admitted that this species of insurance has been oftentimes the cause of fires, the benefits really outweigh the mischiefs ascribed to it, and it would at this day be difficult to conceive how the vast movements of trade and manufacture could be carried on without the protection of fire insurance. The immense accumulations of merchandise demand it, and notwithstanding the serious objections stated, it is essential to credit and the great industrial interests of the country. The general practice marks the civilization of the age in which we live, and has now become indispensable to the interests of trade and progress.

With all the development made in this important branch of political economy there yet remains much to be done before the business of fire insurance will be reduced to anything like the exactness its importance demands. Many reforms must be introduced, systematic statistics on fire insurance must be obtained and classified so as to afford a scientific basis on which the business should be conducted. The evils of over-insurance, so productive of incendiarism; loose underwriting; hasty adjustment and payment of losses, as an encouragement to criminal carelessness or positive fraud, with numerous irregularities that have insidiously crept in upon the business, must be corrected before it can claim the high rank to which it is entitled.

There is a great law of average governing the business, certain and universal as the law of gravitation, though it is as yet imperfectly understood. Its principles are even now sufficiently well known to afford a safe

guide for the practical administration of the business, and with a wise caution on the part of the public there is little danger that a business like that of fire insurance, commanding as it does its full share of skill, talent, integrity, and honor, will be wantonly thrown into the hands of men or corporations devoid of all these qualities. It is a matter of public concern that these great interests, so intimately interwoven with all the industrial pursuits of the country, should be so conducted as to lessen one of the burdens that now presses so heavily upon them. Such should be the aim of those to whom these interests are entrusted, to the end that undoubted indemnity may be secured to the insured and profit to the capital invested.

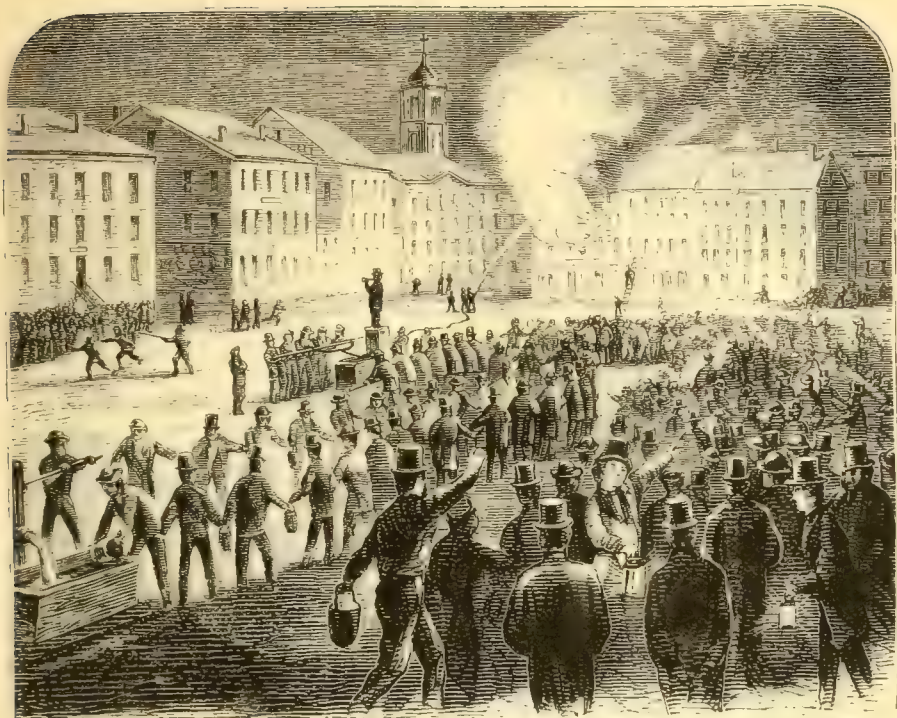
MARINE Insurance is of a much older date than fire, and is supposed to have existed under the early Roman Emperors.

The Lombards from Italy introduced marine underwriting into England about the end of the 14th century. The first organized Company in New York was the New York Insurance Company in 1796, with a capital of \$500,000. The business has increased under Stock and Mutual Companies until the total assets in 1860 were \$21,867,198, and in 1871 \$25,874,146. Total losses for same time were \$138,658,961.

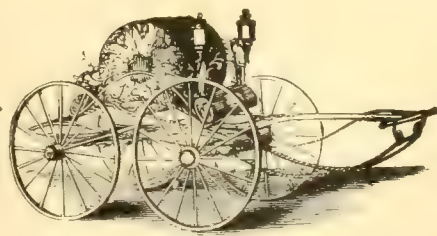
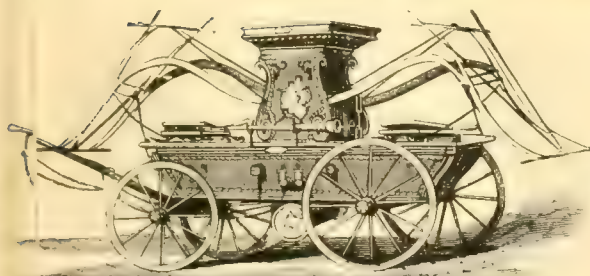
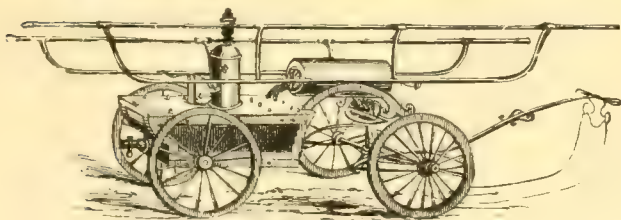
The "United States Lloyds," of New York, is composed of 100 individual underwriters, who have each paid into the common fund or capital \$1,000, and each of whom is personally liable for at least an hundredth part of each and every risk taken by the attorneys of the association.

The Fire and Marine Companies of Massachusetts in 1868 insured \$104,654,966 — received \$2,458,256 premiums, and sustained losses to the amount of \$1,709,872. Many of the fire companies assume also inland risks on our Western rivers and lakes, and there are a large number of companies scattered along the great rivers of the west devoted exclusively to this class of business. It is, however, impossible to obtain information sufficiently accurate to warrant any general classification.

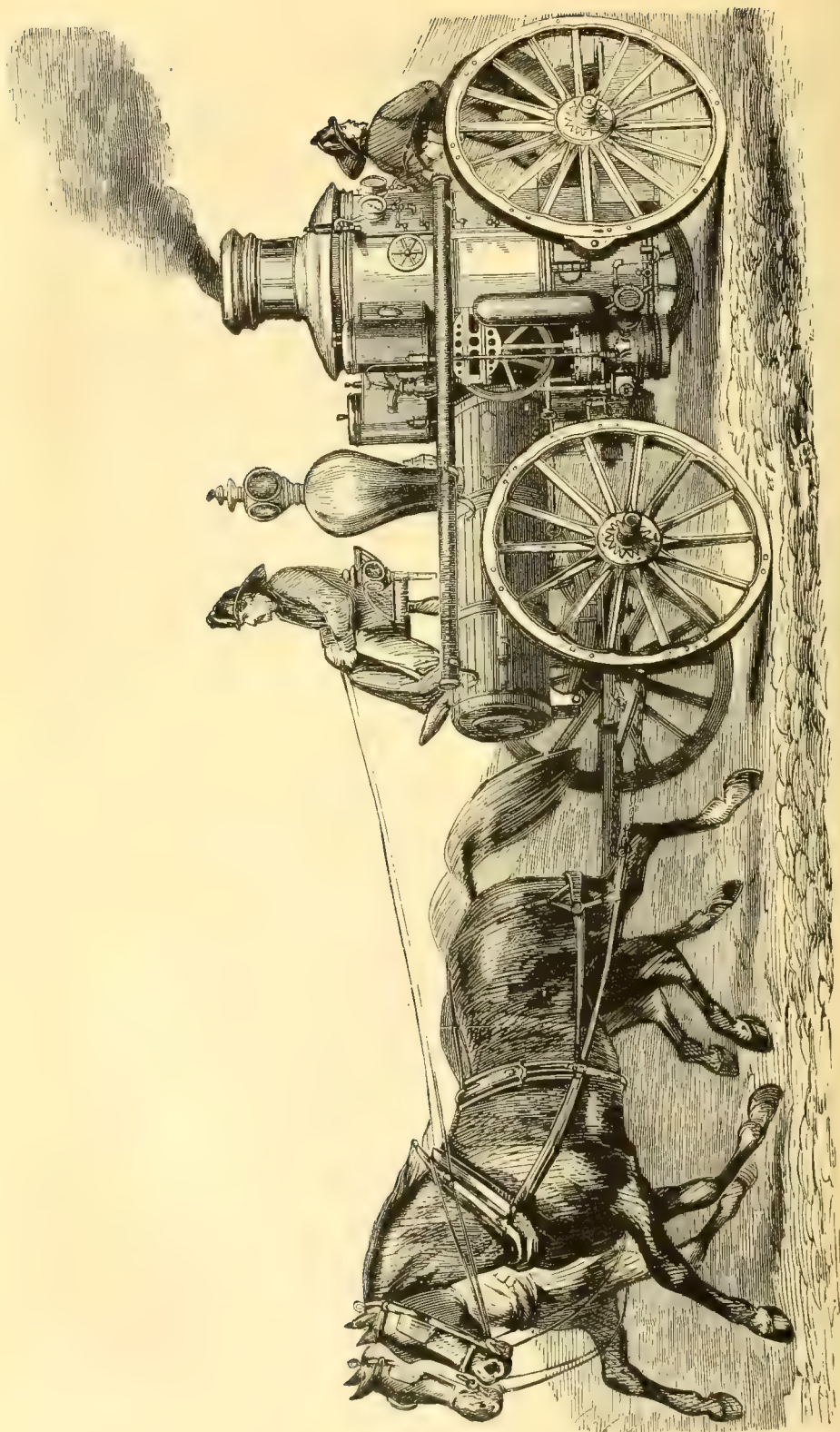
The business of marine insurance has made rapid progress within the last fifty years under the mutual plan, which seems to be the only system adapted to its successful prosecution in this country.



EARLY MAKE OF FIRE ENGINE WITHOUT SUCTION, WATER BEING SUPPLIED WITH BUCKETS.



HOOK AND LADDER HOSE CARRIAGE, AND MODERN HAND FIRE ENGINE, WITH SUCTION AND FORCE PUMPS.



AMOSKEAG FIRE-ENGINE.

LIFE INSURANCE.

LIFE INSURANCE treats human life as productive capital, as having absolute and definite money value, and offers indemnity against its loss. Every person engaged in a productive industry, or whose income depends in any degree upon his labor, skill, or care, is worth in money to those dependent upon him what he earns, and is to earn for them during the period he may expect to live according to the average duration of life among men of his age. If he die prematurely, his dependents lose just so much capital or money as would be earned by him had he lived his full limit. Life insurance brings together the men so situated, and upon their contributing to a common fund, according to their several chances of dying, according to the law of mortality, undertakes to replace to the surviving dependents the capital lost by the death of him who produced it for them.

As regards the individual, nothing is so uncertain as the time of his death; as regards the multitude, nothing is so uncertain as what individuals will die first, or within a given time; but, on the other hand, nothing is so certain as that the individual must die at some time: and that among the multitude, the individuals will die at a certain rate until all are gone. To ascertain the rate of death or mortality, is therefore the consideration of first importance to a Life Insurance Company. This can be done only by a long and careful observation of a number of lives sufficiently large to give a uniform operation of the law of average in each year. Many tables of mortality, more or less imperfect, according to the circumstances of their construction, have been prepared and used. Those in use in modern offices are principally four, the Carlisle, the Actuaries, Farr's Table No. 3, and the American Experience. Any of these seem,

by the experience of American companies at least, to place the rate of mortality so high as to make them safe guides for offices which accept only sound lives, as is generally the case. Experience proves the rate to be an increasing one; that is, the proportion of the dying to the living, increases with each year of age; in consequence of which the contribution each person insured would be called upon to make in payment of policies of decedents would considerably increase from year to year. For example, suppose 10,000 persons mutually insuring each other for \$10,000 each, at the age of 30; the first year each survivor would have to contribute \$84.71 to pay the losses occurring during that year. In the tenth year he would have to pay \$102.03; in the twentieth year, \$152.64; in the thirtieth year, \$207.96, nearly a thousand dollars in the forty-fifth year, over two thousand in the fifty-fifth year, and so on. It was found necessary to devise means whereby a company could provide the increasing sums necessary to pay its increasing losses, and at the same time demand from its members no increase of their annual contribution or premium. This could only be done by charging a premium in excess of the losses for the first years of the contract, and reserving the excess to meet the future rapid losses. This accounts for the large accumulation of assets by the life offices, as compared with the fire. To take the example just given: Suppose the company assumes that it can earn four per cent. compound interest, on any investments for the next seventy years, and charges each of the ten thousand members \$169.72 each, for life: it will receive for the first year \$1,697,200, pay out \$840,000 for losses, and have in reserve, from the premiums and interest, \$930,700 invested in some sort of proper assets; the second

year it will receive in premiums \$1,682,942, and pay for losses \$850,000, and have in reserve, from premiums, interest, and former reserve, \$1,875,512: the fifth year it will receive in premiums \$1,639,156, pay for losses \$880,000, and have in reserve, from premiums, interest, and former reserves, \$4,793,169; the tenth year it will receive in premiums \$1,562,782, pay for losses \$930,000, and have in reserve, from premiums, interest, and former reserves, \$9,936,629: the twentieth year it will receive in premiums \$1,388,479, pay for losses \$1,230,000, and have in reserve \$20,721,981: in the thirtieth year it will receive in premiums \$1,101,143, pay for losses, \$1,890,000, and have in reserve \$27,423,219: the highest reserve will be in the thirty-third year, when the premium receipts will be \$996,596, losses \$2,140,000, and the reserve \$27,913,843: in the fortieth year the premium receipts will be \$705,017, the losses, \$2,650,000, and the reserve, \$24,690,628; the reserve is now being constantly drawn upon to pay losses which have really exceeded the premium receipts since the twenty-third year; the fiftieth year the premium receipts will be \$261,538, losses \$2,300,000, and reserve, \$10,428,688: the sixtieth year the premium receipts will be \$25,797, losses \$630,000, reserve \$1,310,591: in the sixty-seventh year the premium receipts will be only \$339, losses \$20,000, reserve \$18,484, and only two persons left alive, who will die within the

next three years, and the \$18,484 reserve, with the additional premiums to be paid by them, and the four per cent. interest will provide the \$10,000 to be paid at the death of each, and leave not a cent in the hands of the company. Every dollar of the vast accumulation it once held was reserved against a day of certain need, and went in its appointed time to its appointed owner, according to the law of mortality.

The constant additions of new lives, procured by the companies, prevents any such extinction of assets as is above shown, by replacing the reserves withdrawn by old members, with those derived from the new. There is always in progress, the practical substitution of a new company for an old one.

No enterprise has had more rapid growth in this country within the last ten years, than Life Insurance. On the first of January, 1871, there were 113 companies incorporated by the several States; these had in force 834,498 policies, insuring the immense sum of \$2,263,438,213. The necessary reserve to provide for the ultimate payment of this sum was, at that date, about \$250,000,000, and they held assets amounting to \$300,616,056. Over 620,000 of these policies were issued by only 24 companies, who also held over \$232,000,000 of the entire amount of assets held by all the companies. The following table shows the distribution of this business by States:

State.	No. of Co's.	No. of Policies.	Amount insured.	Amount of Assets.	Average amount of Assets to each Co.
Maine, - - -	1	15,852	\$36,008,360	\$5,235,233	
Vermont, - - -	2	3,494	6,500,323	1,075,111	\$537,555 50
Massachusetts, -	6	52,137	135,180,840	17,724,629	2,954,104 66
Rhode Island, -	1	2,743	6,359,718	817,897	
Connecticut, -	9	177,676	447,207,886	65,373,407	7,268,600 00
New York, - - -	41	377,744	1,048,589,779	133,546,120	3,257,222 43
New Jersey, - -	4	45,339	148,738,850	23,343,275	6,885,818 75
Pennsylvania, -	6	*23,778	64,493,461	16,519,647	2,753,274 50
Maryland, - - -	2	1,425	4,296,772	623,332	311,666 00
Delaware, - - -	1	1,052	1,841,907	187,923	
Virginia, - - -	1	8,715	28,178,654	1,606,063	
South Carolina, -	1	320	1,099,040	47,375	
Georgia, - - -	1	1,592	5,075,425	562,607	
Alabama, - - -	1	790	1,808,500	331,235	
Louisiana, - - -	1	408	2,070,500	264,242	
Tennessee, - - -	1	3,467	83,361,709	2,045,169	1,022,590 00
Kentucky, - - -	2	2,530	9,543,243	1,059,142	529,561 00
Missouri, - - -	1	33,256	131,388,883	10,671,534	1,333,941 75
Ohio, - - -	4	11,807	22,135,199	1,375,962	343,988 00
Illinois, - - -	6	9,545	13,938,708	2,364,404	390,734 00
Indiana, - - -	1	1,011	2,433,314	177,311	
Michigan, - - -	1	1,674	3,021,065	219,842	
Iowa, - - -	1	452	736,622	166,637	
Minnesota, - - -	1	326	703,700	137,460	
California, - - -	2	2,568	8,357,745	1,361,683	

The following table shows the comparative magnitude of the business of Life Insurance in the United States as compared with Great Britain, the English Colonies, and Germany :

	Number of Companies.	Number of policies.	Amount insured.	Assets.
United States,	113	834,498	\$2,263,488,213	\$300,616,056
Great Britain,	85	1,225,398	1,437,969,895	459,330,350
English Colonies,	4	12,741	26,050,270	6,079,815
			Thalers.	Thalers.
Germany,	36	424,922	401,032,407	61,446,040

The largest foreign company is the Gotha of Germany, which had in force January 1st, 1871, 36,392 policies, with assets amounting to 19,439,728 thalers. The Mutual Life of New York, the Connecticut Mutual, and the Aetna of Hartford, the Mutual Benefit of New Jersey, and the New York Life, each had a larger number of policies in force at that time, and possessed a larger amount of assets, some of them several fold.

IMMIGRATION.

CHAPTER I.

GENERAL MIGRATION—COLONIES AND UNITED STATES.

At the date of the recent national census, (1870) nearly one-seventh of the inhabitants of the United States, (5,566,546 out of 38,555,983) were of foreign birth, and since that time (to Jan. 1, 1872) about 500,000 more aliens have arrived in this country. Of those classed as "natives" in the census, quite as many more are children, one or both of whose parents were foreigners. It may, then, be safely computed that two-sevenths of our population are either of foreign birth or parentage. This is irrespective of the large negro element, most of which has been in this country for more than one generation.

The term "native" has been used to distinguish the born citizen from the newly arrived foreigner, as well as the former from the "red man," who was also an emigrant in the view of the lost races that preceded him, and of which monumental traces alone remain in evidence that they ever existed. The history of the human race is a history of migration. Twice has the race comprised only a single family, occupying a single point on the earth's surface, and twice has it spread in all directions, forming nations and founding empires. The antediluvian world was swept away by the deluge, and all traces of the race of Adam had been washed away by the obliterating waters from the earth's surface when the ark gave up its freight. From its door migration was resumed, and three continents owe their populations to the several sons of the patriarch. Asia, Africa, and Europe were settled by Shem, Ham, and Japhet and their descendants, who have stamped their characteristics upon each. From that day to the present, the same recurring circumstances have from time to time produced the same results. As each locality became overcrowded by increase, the most adventurous sallied forth in quest of new homes, which, in their turn, filled, and

overflowed into some more distant region. These successive waters rolling on until the remotest shores of each continent were occupied, were succeeded by more formidable hosts of armed invaders, who came, sword in hand, to dispossess occupiers and seize accumulated wealth. With the growth of modern civilization migration has no longer a destructive character. It seeks to build up by bringing industry and aid of natural resources, rather than to destroy by seizing what others have produced. It is more steady and effective in its commercial character—having industry for a means and prosperity for an object—than in its old form of invasion, plundering by force and leaving desolation in its train.

The British Islands were the last subjects of European incursions. The Britons, of mythic origin, were plundered by Norse enterprise, and the Saxons alternated with the Danes in dominating the nation on the withdrawal of the Romans, to be in their turn subjected to the Normans. Since then 800 years have been spent in amalgamating the races and in peopling the islands. Even at that date the adventurous Norseman, in search of the whale, had discovered the new continent and formed a colony on what is now known as Newfoundland. It required long centuries, however, in that barbarous age, for the people to struggle successfully against the effects of feudal oppression, civil wars, and their consequences, famine and plague. Nevertheless, progress was made and commerce a good deal developed, when, at the close of the fifteenth century, the discovery of the West Indies by Columbus was followed by an influx of the precious metals into Europe, giving a renewed impetus to industry and enterprise. The Spanish were attracted by gold, and the commercial Dutch by the desire to found colonies, and their example was followed by the English and French. In both these cases, however, the desire of civil and religious freedom was a powerful incentive to the emigrants. These motives were more strongly developed when

the English revolution began to operate in the first half of the 17th century. The new world was then looked upon as the place of refuge, and Cromwell himself, with his companions, were only prevented from migrating by the interposition of the government which they afterward overthrew. Of the four leading nations that planted colonies on this continent, the English alone became permanently successful. The Spaniards sought gold only. The French settlement of the Mississippi was more a financial bubble of Law than a movement of settlers. The Dutch had not sufficient breadth at home to sustain the undertaking; and the English necessarily absorbed the whole, with their steady industry and abiding religious faith.

The disposition to emigrate to America gradually gained ground as the eighteenth century advanced, more particularly in the north of Ireland and Scotland, which already enjoyed the advantage of some intercourse with friends in America. Just before the Revolutionary war, this disposition to emigrate showed itself strongly. The linen weavers in the northern part of Ireland were, by the decline in that trade, induced to migrate. For two years, 1771 and 1772, sixty-two vessels left with eighteen thousand passengers for America, paying passages seventeen dollars each. Most of these were linen weavers and farmers, possessed of property, and they carried with them so much money as to attract the notice of the government. The movement, however, continued in 1773 and extended itself to the north of Scotland, whence the highlanders migrated in great numbers. Knox, in his view of the British empire at that time, asserts that in the twelve years ending in 1775, about thirty thousand highlanders emigrated, exclusive of the lowlanders; and it was computed that there were sixty thousand highlanders citizens of the United States in 1799. In the report of the committee on the linen manufactures in the Irish Parliament in 1774, it is stated that the whole emigration from the province of Ulster was estimated at thirty thousand people, of whom ten thousand were weavers, who, with their tools and money, departed for America; thus adding to the numbers and wealth in the new world, in the proportion that the British Islands lost from the same cause.

The breaking out of the War of Independence, naturally interrupted the commu-

nication between America and the old world; but with the return of peace, in 1783, the migration revived, notwithstanding the incredible hardships which at that time attended the transit. The shipping was little adapted to the trade, and no special laws protected the rights of the poor emigrant. As an instance of this, it is related that in September, 1784, a ship left Greenock with a large number of passengers, who had paid twenty-five dollars each for their passage. They were robbed of their chests and provisions by the master, and one hundred of them turned ashore on the Island of Rathlin, coast of Ireland. Another vessel rescued seventy-six emigrants from a desert island, where they had been turned adrift by the master of a brig, who had engaged to carry them from Dunleary, in Iceland, to Charlestown. In the same year there were great numbers landed at Baltimore, Philadelphia, and elsewhere. Blodgett's Statistical Manual, published in 1806, states that from 1784 to 1794, the arrivals were four thousand per annum. In the year 1794, ten thousand persons were estimated to have arrived in the United States. Adam Seybert, a member of the House of Representatives, in his "Statistical Annals," admitting the number for that year, states that so large a movement did not again occur until 1817.

When the colonies separated from the mother country, the population of the latter was, for England and Wales, 7,225,000, and about 2,000,000 for Ireland, making together 9,225,000 souls, or about one-fourth the present inhabitants of the United States. The population of the newly formed United States in the year 1790 was 3,174,167 whites, or about one-third the numbers in England and Wales. The founders of the nation were then not unmindful of the fact that these three millions of people, occupying 163,746,686 acres of land although possessed of a vast territory, had little else to depend upon. Capital was scarce, and manufactures had not been permitted under imperial rule, hence skilled artisans were not to be found. While all these things were indispensable to the new country, crowds of poorly paid and oppressed operatives on the other side of the Atlantic were impatient to enjoy the privileges that our new form of government held out to them. The French, German, and English troops, that returned home after the

war, had not only left a portion of their numbers here as settlers, but had carried home favorable reports of the advantages to be here enjoyed. It was manifestly to the interest of the new government here to invite and encourage these settlers, at the same time to guard against possible political abuse of the privilege. The new Constitution therefore required Congress to pass uniform laws for naturalization. This was not done until April 14th, 1802, when the regulations that have since mainly continued were enacted. By that law, those aliens who were in the country prior to 1795 might be admitted to citizenship on proof of two years' continuous residence in the United States, sustaining a good moral character, and abjuring allegiance to foreign nations. Any alien arriving in the United States after the passage of the act was to comply with the following conditions:

1. He shall, before some competent court, swear, at least three years before his admission, that it is his *bona fide* intention to renounce forever all allegiance to any sovereign state to which he was a subject.

2. He shall swear to support the Constitution of the United States.

3. Before he can be admitted he must show that he has resided within the United States five years, and within the jurisdiction of the court one year. He must also show that he has been of good moral character, and well disposed to the happiness of the United States.

4. He must renounce all titles of nobility. The law of March 3, 1813, required that the residence of five years should have been continuous in the United States. This restriction was repealed Jan. 26, 1848. The law of May 26, 1824, reduced the term of notice of intentions from three to two years. These were the chief regulations of the federal government in relation to naturalization. Many of the states have, however, from time to time, passed laws relative to immigrants, importation of paupers, convicts, lunatics, etc. New York and many other states have laws requiring of the owner, or master, or consignee of the passenger ship, a well secured bond to the people of the state against loss for the relief or support of such passengers. In lieu of this bond, commutation money may be paid.

The federal government having smoothed the way, the migration proceeded until

unfriendly relations between the United States and Great Britain, growing out of the wars of Europe, checked intercourse. The claim enforced by Great Britain to the principle, "Once a subject always a subject," served to take from emigrants the security they sought under the American flag; and in 1806 Great Britain declared France in a state of blockade, and France retorted upon the British Isles. These proceedings being succeeded by others, compelled the United States, in 1809, to prohibit intercourse with France and Great Britain. In 1810 Napoleon annulled his decree, but Great Britain continued her vexations, seizing American seamen, and riding rough-shod over their rights. The embargo was then succeeded by the war of 1812, during which migration was very limited. In February, 1815, peace was concluded, and the stream of migration, long pent up, resumed its flow with greater force. The accommodation was, of course, limited, and the more restrained that a law of Parliament restricted the number that might be carried to the United States to one for every five tons, although one for every two tons might be carried to any other country. In the year 1817, 22,240 persons arrived in the United States, including Americans who returned home. This large migration was attended with immense suffering. The attention of Congress was called to it, and a law was passed, March 2, 1819, to regulate the transportation of passengers. This act limited the number to two for every five tons of measurement, and provided for an ample allowance of food and fuel. When the famine of 1846-7 gave a new impulse to the movement, more complete laws were found requisite, and a number were passed. March 3, 1857, the present passenger act was enacted, repealing all former laws upon the subject, which with some slight modifications since made, establishes the regulations now in force. It regulates the space for each passenger, the number of berths, ventilation and warming, and the kind and quantity of food to be furnished by the ship and how it is to be dealt out, and if any passenger is put on short allowance, the master or owner shall pay him three dollars each day of short allowance.

The first accounts of the numbers of immigrants commenced in 1820, under the law of 1819. The following table shows the number of emigrants for fifty years.

THE NUMBER OF ALIEN PASSENGERS ARRIVED IN THE UNITED STATES FROM FOREIGN COUNTRIES, FROM THE COMMENCEMENT OF THE GOVERNMENT TO THE 31ST OF DECEMBER, 1870. THE DATES ARE INCLUSIVE.

COUNTRIES.	Prior to 1820.	1820 to 1830.	1831 to 1840.	1841 to 1850.	1851 to 1860.	1861 to 1869.	Aggregate.
England.....		15,037	7,611	32,092	247,125	154,009	456,704
Ireland.....		27,106	29,188	162,332	748,740	392,685	1,360,051
Scotland.....		3,180	2,667	3,712	38,231	24,913	72,803
Wales.....		170	185	1,261	6,319	3,828	11,763
Great Britain, not specified..		35,534	243,540	848,366	297,578	389,422	1,805,440
Total from British Isles		81,827	283,191	1,067,763	1,338,993	955,887	3,706,761
Germany.....		7,583	148,204	422,477	907,780	690,288	2,176,332
Prussia.....		146	4,250	12,149	43,887	39,949	100,372
Austria.....						4,114	4,115
Sweden and Norway.....		94	1,201	13,903	20,931	93,434	129,563
Denmark.....		199	1,063	539	3,749	14,844	20,384
Holland.....		1,127	1,112	8,251	10,789	8,569	39,148
France.....		8,868	45,575	77,292	79,358	34,162	242,226
Switzerland.....		3,257	4,821	4,644	25,011	21,365	59,098
Belgium.....		28	22	5,074	4,738	6,377	16,239
Spain.....		2,616	2,125	2,209	9,298	6,455	22,703
Portugal.....		180	839	550	1,055	1,790	4,404
Italy.....		389	2,211	1,590	7,012	9,856	21,058
Sardinia.....		22	7	221	1,790	73	2,103
Sicily.....		17	35	79	426	115	675
Malta.....		1	35	78	5		127
Greece.....		20	49	16	31	67	183
Russia.....		89	277	551	457	1,905	3,279
Poland.....		21	369	105	1,164	1,955	3,614
Hungary.....						487	487
Turkey.....		21	7	59	83	124	294
Europe, not specified.....				51	427		526
China.....		3	8	35	41,397	56,116	97,559
Japan.....						185	185
India.....		9	39	36	43	49	176
Arabia.....						33	33
Syria.....						4	4
Persia.....				7	15	3	25
Asia, not specified.....		3	1	4	19		27
Cape of Good Hope.....		2				77	79
Liberia.....		1	8	5	5	31	50
Egypt.....			4			8	12
Abyssinia.....						6	6
Morocco.....			4	1			5
Africa, not specified.....		10	36	47	186	179	458
Algiers.....				2			2
British America.....		2,486	13,624	41,723	59,309	114,009	231,151
Mexico.....		4,818	6,599	3,271	3,078	1,923	19,691
Central America.....		107	44	368	449	71	1,089
Guiana.....						43	43
Venezuela.....						38	38
Peru.....						36	36
Chili.....						26	26
Brazil.....						40	40
Buenos Ayres.....						7	7
Bolivia.....						3	3
New Grenada.....						2	2
Paraguay.....						1	1
South America, not specified		543	856	3,579	1,224	1,163	7,364
Cuba.....						3,598	3,598
Jamaica.....						84	84
Haiti.....						80	80
Porto Rico.....						42	42
West Indies, not specified..		3,995	12,301	13,528	10,660	4,787	45,274
Australia.....		2	3			129	234
Sandwich Islands.....		1	6	28	44	75	154
East India Islands.....		79				20	99
Isle of France.....			2	1			3
New Zealand.....					4		4
Society Islands.....				1	6		7
Islands of Pacific, not spec'd							2
Azores.....		13	29	327	2,873	3,683	6,325
Bermudas.....						58	58
Cape de Verdes.....		4	15	3	7	42	71
Madeira.....		70	52	3	189	9	323
St. Helena.....			1	3	13	9	26
Canary Islands.....		271	6	1	8	4	290
Miquelon.....						3	3
Iceland.....					10	1	11
Countries not specified.....		250,000	32,892	69,799	52,725	25,438	462,808
Corsica.....		2	5	2			9
Barbary States.....		4					4
Aggregate.....	250,000	151,824	599,125	1,713,225	2,598,214	2,112,655	7,425,069
Add emigration to Dec. 31, '70						339,046	339,046
Total from the beginning of the government to Dec. 31, 1870.....						2,451,701	7,766,511

The returns gave the number from Great Britain in many cases without distinguishing the particular divisions where all the passengers were born. A very large portion of the whole, however, came from Ireland. The return shows, then, that Ireland and Germany furnish the largest proportion of the emigrants. Other nations have supplied a greater or less number, but irregularly. Since 1850, or the era of gold discovery, Asia—mainly China and Japan—have sent about 80,000 emigrants to California. Those do not, however, as a general thing, intend remaining. They are for the most part fitted out with small sums borrowed of friends and neighbors, who share in the profits of the adventurer on his return. Numbers of those who come from other countries, as France, West Indies, and Southern Europe, as well as to some extent from England, are merchants and travelers, who are not to be embraced in the aggregate of settlers in new homes. The great sources of migration are, then, British and German, and the latter are confined mostly to the valley of the Rhine. The people of the north of Europe except the Norse folk seem to have lost the nomadic character of their ancestors. It is true that then they were led by chiefs and tempted by plunder to overrun the richer countries of the west, while at the present day migration has no object but to seek an honest living in countries where labor is in demand, and where hospitality and protection await the worker. The Russian peasants while surfs were not allowed to leave their country, and the Russians in the table are mostly merchants and travelers. The Swede and the Norwegian are more free in their choice, and since 1860, have emigrated to this country in large numbers, settling mainly in Iowa, Wisconsin, Minnesota, Kansas, and Nebraska. Many of them also enter into domestic service in our large cities. The Swiss are to a considerable extent free and thrifty in their mountain homes, but great divisions exist in respect of religion as well as politics, and there is among them a want of nationality. The cantons of Vaud and Geneva are mostly French, and threaten to become quite so. On the side of the Tyrol the Swiss become Italians. The German Swiss are mostly connected with Baden, and are embraced in the German movement. The Hollanders migrate to some extent, and often from motives of religion. The Moravian Brethren thus

founded colonies in Pennsylvania. Gold seems, since its discovery in California, to have stimulated Dutch enterprise. The Italians and Spanish do not migrate in the true sense of the word; they leave their homes to some extent for the countries that border the Mediterranean, but they do not, unless under the ban of exile, cross the Atlantic. The Sardinians and Basque Spaniards go to some extent to the La Plata in South America; they do not frankly abandon their country to adopt a new one. The French are more markedly attached to their native soil and national character, and colonize little; they migrate but moderately. Even Algiers has grown but very slowly under thirty years of governmental fostering care, and there are now but 60,000 French in the colony. Of those French who arrived in the United States up to 1870, about 40 per cent remained in the country according to the census.

CHAPTER II.

EUROPEAN MIGRATION—FRENCH AND GERMAN—NEW TRADE.

THE peace of 1815, in re-establishing the liberty of the seas, so long suppressed, opened new countries to European commerce. On the other hand, many interests underwent adverse changes; numerous armies were newly disbanded, and great numbers of men were forced to leave home in search of a useful application of their talents and energies. America was to them the chief point of attraction; those who knew only the trade of arms, offered their swords to the Spanish colonies then fighting for emancipation. Of these a majority found early graves from excess, fatigue, and misery; many turned their attention to agriculture, and the wisest sought refuge in the United States, where services were well requited, and the broad territories offered a limitless field for activity. At first the emigrants were isolated individuals; soon entire families went in quest of new homes, and their success was a tempting example to other families, each of whom drew others in their train, until a continuous movement was established from the valley of the Rhine to America.

This developed a new era in the international commerce. The cotton of the southern states had up to that time found a limited



market in Havre, but being carried thither in American ships, there being little return freight for those vessels, the cotton was charged with freight both ways, out and home. The moment that considerable numbers of passengers offered themselves for the return, that trade of itself became an object, affording a profitable home freight. It was then apparent that the light and elegant models of the American ships, which had so well answered the purpose of speed and efficiency during the war, were not adapted to the transportation of passengers. A different style of construction was needed, allowing of greater stowage of cotton out, and better accommodation to passengers, in accordance with the provisions of the law prescribing the room to be allowed to each passenger. This change causing greater attractions to the American ships, drew increasing crowds from the valley of the Rhine across France to Havre. Many of these poor people could raise only the sum needful for the passage, and depended upon begging their way across France to the port. These crowds of beggars alarmed the government, and it took measures to stop them. It was ordered that no one should be admitted to cross France unless he had previously paid his passage in the ship, was possessed of \$150 or every member of the family over eighteen years of age, and had his passport signed by the French ambassador at Frankfurt. The effect of these absurd regulations was to destroy the trade of Havre, and turn the migration down the Rhine to Antwerp, Bremen, and Hamburg. The Havre merchants made great efforts to remedy the evil by sending agents to aid the emigrants, lending them the money to pass the frontier, and to be returned immediately after. A great rivalry was thus engendered between the northern ports and Havre, which still had great advantages in respect of the number of American vessels that arrived with cotton, and finally the obstacles interposed by the government were removed. The city of Bremen was prompt to take advantage of the error of the French government, and used every effort to attract the emigrants to that port, by granting facilities and protecting them from imposition. A law was passed regulating in the most minute particular the accommodations to be given to emigrants on shipboard. They are not to be taken on board until the moment of departure. To accommodate them prior

to shipment, an immense building was constructed to hold 2,000 people; it has a front of 200 feet, and is 100 in depth. It has public rooms, sleeping apartments, kitchens, baggage-rooms, etc., and is warmed by steam throughout. There are also chapels for catholic and protestant worship, and a hospital, with thirty-three beds. The price charged with board is fourteen cents per day. By these and other means Bremen has acquired a large share of the emigrant business. Hamburg did not make the same efforts; and it is only recently that societies for the protection of emigrants have been there formed.

The Germans formerly preferred to embark at Havre, Southampton, or Liverpool, and on American ships, to sailing from German ports and on German ships; but a change has taken place in this respect of late years. The German steamers, of which there are now three or four lines, are much better than formerly, and having good steerage accommodations, make the passage in 13 or 14 days. The French steamships do not carry emigrants, and as a result of the late war, there are few American steamers running regularly to Europe. Emigration by sailing vessels is seldom attempted now, and only by the lowest class of emigrants. There are numbers who go from Rotterdam, Ostend, or Hamburg, to England, and depart thence to their final destination. From Bremen the emigrant ships go to a greater variety of ports than from Havre. The United States is, however, the ultimate destination of nearly all.

The motives that impel German migration are variously understood. The reports of the numerous emigration societies give evidence of the highest traits of character. The German is described as a persevering worker, seeking to ameliorate his condition. He is always ready to go where his services will be the best paid, and certain professions have long been pursued by him in all countries. If his feeling of nativity is strong, his love of family is still stronger. And, moreover, the Teutonic race may now be said to be at home on half the entire globe. There are, however, other motives, and these are evidently the desire to find civil, political, and religious liberty, of which they have not the perfect enjoyment at home. The Germans have never succeeded in founding colonies of their own under good government, but they are a valuable acquisition where others have established liberty and order. They

seek exemption from military service. They wish to contribute in just proportion to the public expenses, of which they enjoy the benefits, as equal citizens. They seek to escape the trammels of corporations. They wish also freely to dispose of the fruits of their own industry, and by so doing to avoid the misery of destitution. All this that they seek is evidently that which they have not got, or at least very imperfectly, at home.

While Germany was divided into many petty states, their division, which materially checked industry and increased the taxation, was itself an exceedingly strong incentive to emigration; and before their confederation into one government was fully accomplished, almost every family had its representatives here, and the tendency had become so strong for a home in the "land of promise," that no political changes could greatly affect it.

The German governments have all, more or less, occupied themselves with the question of migration, and in some cases have sought to check it. Among these attempts was that by Prussia to found agricultural colonies. The king offered lands in the duchy of Posen, and agents were sent among the emigrants from the valley of the Rhine. The conditions were, that the settlers should not leave the country without permission, and never without having performed military service.

These, it may be supposed, were without success. Emigrant agents are, by some governments, required to submit to regulations; sometimes the number is limited, and sometimes they must give security. In Bavaria only two houses are authorized to treat with emigrants for their passages across France, and the contracts must be inspected by the consul at Havre. There results a large clandestine emigration to avoid these restrictions, and at the frontiers numerous agents are ready to assist—a sort of underground railroad. The governments of Wurtemberg, Baden, and the two Hesses, are less rigorous, but nowhere can passports be obtained until every effort has been made to dissuade the emigrant. In case he persists, he must renounce all rights of citizenship and nationality. On the other hand, measures are taken to aid the emigrant. When the cause of departure is destitution, the communes and the government subscribe, while stipulating that the emigrant shall renounce all right to ulterior aid. All the

persons so aided go from one canton together. When the emigrants pay their own expenses and have a small capital, bands of numerous families from divers points assemble and depart together. Political exiles are very few, but these have generally considerable means.

It is melancholy, however, to reflect in how great a degree destitution becomes the cause of migration. Singularly enough, the valley of the Rhine, of which the German poets sing the beauty and the fertility, is precisely the spot, of all Europe, where the misery of Ireland is most nearly reproduced. From the Lake of Constance to the frontiers of Holland, that famous valley has so long felt the oppression of feudalism and been the battle-field of contending powers, as to have become completely impoverished. In the duchy of Baden the day's wages of a skilled workman is twenty-eight cents—a sum which may sustain life in a year of good harvest, but which is utterly insufficient in time of dearth, as in 1846, when potatoes became diseased. The insurrection of 1849 added to the calamities, and in 1852, of a population of 1,356,943 souls, 14,400 emigrated, or one per cent in one year. The thrift and endurance of the Germans are well developed in a land of such hardships, and on their arrival in the United States they are not slow in turning their persevering industry to account. It is singular that the distress and destitution which centuries of misrule have produced in Ireland, so famed for its natural advantages, should be reproduced in Europe only in the Rhine valley, the garden of Europe. The two localities best endowed by nature are precisely those where man is most anxious to escape by migration from an accumulation of miseries. The highest migration from Germany, by the four ports of Hamburg, Havre, Antwerp, and Bremen, rose to 203,537 in 1854. The movement has since declined, fluctuating with the harvests. There are, however, considerable numbers who go, by other conveyance from those ports than the emigrant ships, to Liverpool, and embark thence for America. This aggregate German movement has come of late years to rival, and in some cases to exceed the broad stream of British migration. The migration from Great Britain has always been largest in the years of dear food, and it has again subsided when good harvests have diminished the prices of bread. The number that went abroad in 1843 was 57,212, and it continued

to augment year by year until it reached 368,764 in the year 1852. Several causes concurred to produce this increase. The first was the famine of 1845-46-47, and the consequent means adopted by the British government for the relief of Ireland; the second was the gold fever, which carried off thousands; and the third was the prosperity of the emigrants in the United States, where railroad building and other employments gave the means to send for friends in unusual numbers. The most important cause was, probably, the condition of Ireland. The conquest of that country, which was commenced seven centuries since, is but now being completed. We now see the insubmissive Celts quitting, with the aid of their conquerors, the disputed country, to seek new homes beyond the seas. They cannot assimilate to the conquering race, and not being able to defend themselves, they abandon the country rather than submit. During all the time of religious persecution, from the reign of Henry VIII. to George III., the economical condition of Ireland was deplorable, and misery made incessant progress. The landed population became involved in debt, and a fatal subdivision of the land was introduced in the mode of culture. Farms were subdivided as fast as the people multiplied, which was fully equal to the proverbial fecundity of a state of extreme poverty, and the potato came to be the sole dependence of all for food. The sudden destruction of that dependence by rot was an overwhelming calamity, that brought matters to a crisis. It was felt that migration could not remedy the evil, but that a radical change in a wrong system was become indispensable. The system pursued had been for the landlords, mostly in debt, to absent themselves altogether. The land was then taken by "middle men," at a rate which hardly met the interest on incumbrances. This land was then parcelled out to the poor cotters in lots down to one-fourth acre or less, mere patches, at rates which gave a large aggregate rent to the "middle man." Those patches were planted with potatoes, which were the sole dependence of the family for food in the year. They were gathered, when ripe, into a pile, and that pile diminished by daily consumption until an approaching new crop found it exhausted. The supply of food for the year depended entirely upon the amount of the crop. Its yield was the sole dependence of the family

to sustain life. The cotter had no property or capital of any kind to be made available in case of emergency. His only means of paying rent was an annual migration to England in harvest time to earn the necessary sum. That done, the balance of the year was idly spent in watching the sinking pile of potatoes. It may well be imagined how great was the horror that seized such a people when the sole barrier between themselves and starvation was found rotten, suddenly perishing under their eyes. The scenes that followed were awful to contemplate. All that could, fled, and these were mostly the robust males, leaving the infirm, the old, and the young to encounter the slow death that was gradually approaching, and which overtook multitudes. The greatest efforts were made by the British government to purchase and distribute food, and to employ hands upon roads. At one time over 500,000 were so employed. The introduction of the Indian corn was attempted as a substitute; but it was nearly impossible amid a people entirely ignorant of its use. Hand-mills were furnished to grind it, and the priests and others used great exertions to teach them to cook it. It was frequently the case, however, that the grain did not agree with the people, but exhibited poisonous effects on being eaten. The body swelled, and severe illness ensued. Migration and famine did its work in spite of all efforts of humanity, and the census of 1851 showed how awful had been the havoc.

The population of Ireland has been as follows, per official reports:—

1821,	6,801,827	1851,	6,622,984
1831,	7,767,401	1861,	5,850,309
1841,	8,222,664	1871,	5,402,759

Decrease from 1841—30 years, 2,819,905

In the ten years ending with 1831, the increase was one and a half per cent. per annum. From that date to 1841 it was nine-tenths of one per cent, and that was a period of much comparative prosperity. The crops were still good, and the failure of the English wheat crops in 1837 raised the prices of Irish grain, and gave much employment to its agriculturists. If it had continued the same rate up to 1847, the famine year, the population would then have been 8,616,680 souls, when the migration took place in large numbers, and continued the succeeding thirteen years down to 1859. The same increase in that thirteen years would have made the

population 9,651,678 persons, or as follows:—

Population in 1841.....	8,175,124
Ten years' increase at 9 per cent	735,761

The population should have been in 1851.....	8,910,885
Actual population	6,553,291

Loss by famine and migration.....	2,357,594
Number emigrated.	1,422,000
Population in 1851.....	6,623,982
'Ten years' increase at 9 per cent.....	595,500

The population should have been in 1861.....	7,148,791
Actual population.....	5,850,309

Loss by migration, etc.....	1,298,482
Number emigrated.....	1,972,499

In the famine years, up to 1851, 935,594 persons disappeared more than were accounted for by migration. From 1851 to 1861, there migrated 674,017 more persons than should have been lost by the census. The numbers who have returned were for a time, it is known, upwards of twenty thousand per annum, and these carried back much larger sums than they brought with them.

In this view the emigration reacted upon the northern states, the emigrants carrying off all that they have created. The whole operation above was as follows for fifteen years:—

Population in 1847.....	8,616,680
" 1861.....	5,850,309

Decreased	2,766,371
Emigrated	3,393,499

Excess.....	372,872
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Carrying forward the estimate, the population in 1861 was.....	5,850,309
Ten years' increase at 9 per cent....	526,527

The population should have been in 1871.....	6,376,836
Actual population.....	5,402,759

A loss by migration, etc., of.....	974,077
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The first reformatory efforts of the English government were to throw the support of the Irish poor upon the parishes, and as the tax became onerous the forced sale of the encumbered estates was authorized. The two measures have succeeded. The land has passed into thrifty hands; the bankrupt landlord is dispossessed, and the extortionate "middle man" is abolished; and the excessively poor population has been purged off by migration. The "clearing of the lands" was in many cases conducted with much barbarity. The little huts of the peasants were pulled

or burned down, and the hapless people driven forth to seek homes beyond the seas as they best could. In other cases the landlords, the government, or societies furnished the means of shipments. The government soon found the necessity of interposing by law, as the United States had done, to protect them from the rapacity of shippers and their agents. The law of 1849 was passed with that object. By its provisions no ship shall carry more than one person for every two registered tons; nor shall there be more than one person for every twelve superficial feet on the main deck and below it. The size, number, and construction of the berths are regulated, and the captain is required to issue food as follows to each person twice a week:—

Bread.....	2½ lbs.
Wheat Flour.....	1 "
Oatmeal.....	5 "
Rice.....	2 "
Tea.....	2 oz.
Sugar.....	½ lb.
Molasses.....	½ "

A surgeon must be carried where there are one hundred or more passengers, and many other regulations that experience has pointed out as necessary, are enforced upon the carriers. The food is to be furnished entirely irrespective of the price of the passage, which fluctuates almost daily between \$16 and \$24 each adult, and half price for children. The starving and destitute race each year sends forth crowds from all parts of Ireland to embark at Liverpool. The means are mostly furnished by Irish in America, who consider it their duty to appropriate their first earnings in their new homes to the rescue of their relatives, and small remittances, aggregating millions in a year, find the way into every cabin and workhouse as messengers of life to the despairing. Those poor people, once started on their travels, encounter numerous perils before reaching their destination. As soon as a party of emigrants arrives in Liverpool, they are beset by a tribe of people, both male and female, who are known by the name of "man-catchers" and "runners." The business of these people is, in common parlance, to "fleece" the emigrant, and to draw from his pocket, by fair means or by foul, as much of his cash as he can be persuaded, inveigled, or bullied into parting with. The first division of the man-catching fraternity are those who trade in commissions

on the passage money, and call themselves the "runners" or agents of the passenger brokers. The business of the passenger broker is a legitimate and necessary one. Under the passenger act of the 12th and 13th Victoria cap. 3, the licenses of all the passenger brokers expired on the 1st of February, 1850, subject to renewal after their being approved of by the government emigration agent, and to their entering into bonds, with two sureties, in the sum of \$1,000, for the due fulfilment of all the requirements of the act of Parliament relating to the comfort and security of emigrants. The passenger brokers at Liverpool, in common with the unwary and unsuspecting emigrants, have suffered greatly from the malpractices of the "runners," who pretend to be their agents. These man-catchers procure whatever sums they can from emigrants as passage money—perhaps \$25 or \$30, or even more—and pay as little as they can to the passenger broker, whose business they thus assume—often as little as £3, or £3 5s. In addition to these large and knavish profits, they demand a commission of seven and a half per cent. from the passenger broker, and they have been often known to obtain and enforce this commission, although their whole concern in the matter may have been to watch the number of emigrants going into or coming out of the brokery office, and to put in a claim for having brought or "caught" them.

To form an idea of the sums paid in any one year as commission to the man-catchers, in the item of passage money, we have but to take the total steerage emigration of that year and multiply it by £3 10s., or seventeen dollars—the average amount of passage money—and calculate what a per-centage of seven and a half per cent. would amount to. The total steerage emigration of 1859 was one hundred and forty-six thousand one hundred and sixty-two souls, which, at seventeen dollars a head, would amount to no less than two million four hundred and eighty-four thousand seven hundred and fifty-four dollars, on which, taking the commission at the low rate of six per cent., they draw one hundred and forty-nine thousand and forty dollars, which is generally stated to be about the sum actually paid to this particular class of people, on the average of the last three years, by the passenger-brokers of Liverpool. But these are not the only class of the man-catching fraternity, nor do they confine their

operations to an exorbitant profit upon passage money. The man-catchers keep lodging-houses for emigrants—wretched cellars and rooms, destitute of comfort and convenience, in which they cram them as thickly as the place can hold. The extra profits they draw from this source cannot be inferior in amount to their previously mentioned gains, and the cherished hoards of the poor pay a large per-centage to their unscrupulous rapacity.

In addition to this trade, some of them deal in the various articles composing the outfit of emigrants, such as bedding, clothes, food, cooking utensils, and the nick-nacks of all kinds which they can persuade them to purchase. Some of the store-keepers in this line of business pay their "runners" or "man-catchers" as much as ten per cent. commission on the purchases effected by the emigrants, from which the reader may form some estimate of the enormous plunder that must be drained from the poor ignorant people. As every emigrant must provide his own bedding, the sale of mattresses, blankets, and counterpanes, enters largely into this trade. After the bedding is provided, the man-catchers, who are principally Irishmen themselves, and know both the strength and weakness of the Irish character, fasten upon their countrymen—many of whom, poor and miserable as they look, have sovereigns securely stitched amid the patches of their tattered garments—and persuade them into the purchase of various articles, both useful and useless. Among these may be mentioned clothes of all kinds—shirts, trowsers, waistcoats, shawls, petticoats, south-westerns, caps, boots and shoes, slippers, cooking utensils, cans for the daily allowance of water, and tins to hold their meal, rice, and sugar. Provisions, such as bacon, herrings, salt beef, and other articles not found them on board, and luxuries, in which whiskey and tobacco are generally included, come next on the list, after reiterated assurances from the man-catchers that no emigrant will be taken on board without them. These being provided, and an Irishman being easily squeezeable when a friend and a countryman is the man-catcher who has him in hand, and when he fears that his passage-money will be lost for non-compliance with the regulations, his attention is next directed to such articles as pocket-mirrors, razors, bowie-knives, pistols, telescopes, etc.

The stranger in Liverpool, who takes a walk in the immediate vicinity of the Water-

loo Dock, whence the greater number of emigrant vessels take their departure, will see a profuse display of the various articles upon which the man-catcher makes his gains—articles generally of the most inferior quality, and sold at the most extravagant and ridiculous prices. The man-catching business, in all its various departments, has been reduced to a regular system, and no London sharper can be more sharp than the Liverpool runners. Perhaps the most complicated and ingenious trick is the following: When a steam-vessel laden with emigrants leaves an Irish port for Liverpool, one of the Liverpool fraternity, dressed up as a raw Irishman, with the usual long-tailed, ragged, and patched gray frieze coat, the battered and napless hat, the dirty unbuttoned knee-breeches, the black stockings, the shillelah, and the short pipe, takes his place among them, and pretends to be an emigrant. Before the vessel arrives at Liverpool he manages to make acquaintance with the greater portion of them, learns the parish they came from and the names of the relatives whom they have left behind, not forgetting those of the parish priest and the principal people of the neighborhood. He also ascertains the names of the friends in America whom they are going to join. He tells them of the roguery of Liverpool, and warns them against thieves and man-catchers, bidding them take especial care of their money. On arriving at the quay, in Liverpool, he jumps ashore among the first, where a gang of his co-partners are waiting to receive him. He speedily communicates to them all the information he has gained, and the poor people on stepping ashore are beset by affectionate inquiries about their friends in Ireland, and that good old man the parish priest. They imagine that they have fortunately dropped among old acquaintances, and their friend of the steamboat takes care to inform them that he is not going to be “done” by the man-catchers, but will lodge while at Liverpool at such and such a place, which he recommends. They cannot imagine that men who know all about the priest and their friends and relatives can mean them any harm, and numbers of them are usually led off in triumph to the most wretched but most expensive lodging-houses. Once in the power of the man-catchers, a regular siege of their pockets is made, and the poor emigrant is victimized in a thousand ways for his passage money, for his clothes and utensils, and for his food. Even after they have

drained him as dry as they can, they are loth to part with him entirely, and they write out per next steamer a full, true, and particular account of him—his parish, his relations, his priest, and his estimated stock of money—to a similar gang in New York. Paddy—simple fellow—arrives in New York in due time, and is greeted on landing by the same affectionate inquiries. If his eyes have not been opened by woeful experience, he thinks once more that he has fallen among friends, and is led off by the “smart” man-catchers of the New York gang, to be robbed of the last farthing that he can be persuaded to part with; and he is possibly induced to spend the savings of years in the purchase of land, supposed to be in the far west, but having no other existence but such as paper and lies can give it.

It must not be supposed, from the statements in reference to the rogueries practised by runners and man-catchers upon the simple, emigrants themselves do not occasionally endeavor to commit frauds, both upon each other and upon the owners and captains of ships. The Irish emigrant, with the passion for hoarding which is so common among his countrymen, often hides money in his rags, and tells a piteous tale of utter destitution, in order to get a passage at a cheaper rate. The shameless beggary, which is perhaps the greatest vice of the lower classes of Irish, does not always forsake them, even when they have determined to bid farewell to the old country; and I have several times been accosted by men and women, on board emigrant ships in dock, and asked for contributions to help them when they got to New York. “Sure, yer honor, and may the Lord spare you to a long life; I’ve paid my last farden for my passage,” said a sturdy Irish woman, with a child in her arms, when accosted on the quarter-deck of a fine ship, in the Waterloo Dock, “and when I get to New York I shall have to beg in the strates, unless yer honor will take pity on me.” On being asked to show me her ticket, she said her husband had it; and her husband—a wretched-looking old man—making his appearance and repeating the same story, was pressed to show the document. He did so at last, when it was apparent that he had paid upwards of seventeen pounds—eighty-two dollars and twenty-five cents—for the passage of himself and wife and his family of five children. “And do you mean to say that you have no money left?” was inquired

of him. "Not one blessed penny," said the man. "No, nor a fardin," said the woman, "and God knows what'll become of us." "Do you know nobody in New York?" "Not a living sowle, yer honor." "Have you no luggage?" "Not a stick or a stitch, but the clothes we wear." As the good ship was detained two days beyond her advertised time of sailing, all the emigrants, as usual, had liberty to pass to and from the ship to the streets, as caprice or convenience dictated. On the following day, this sturdy woman and her husband were seen entering the Waterloo Dock gates with a donkey-cart, tolerably well piled with boxes, bedding, and cooking utensils. When they were down in the steerage, and she was asked whether that was her luggage, she replied it was. "You said yesterday, however, when you were begging, that you had no luggage." "Sure, it's a hard world, yer honor, and we're poor people—God help us."

An incident of a kind not very dissimilar occurred on board of another American liner. When the passenger roll was called over, it was found that one man, from the county of Tipperary, had only paid an instalment upon his passage money, and that the sum of \$6 each for three persons, or \$18, was still due from him. On being called upon to pay the difference, he asserted vehemently that he had been told in the broker's office that there was no more to pay, and that to ask him for more was to attempt a robbery. The clerk insisted upon the money, and showed him the tickets of other passengers to prove the correctness of the charge. The man then changed his tone, and declared that he had not a single farthing left in the world, and that it was quite impossible he could pay any more. "Then you and your family will be put on shore," said the clerk, "and lose the money you have already paid." The intending emigrant swore lustily at the injustice, and declared that if put on shore he would "get an act of Parliament" to put an end to such a system of robbery. The clerk, however, was obdurate, and the man disappeared, muttering as he went that he would have his "act of Parliament to punish the broker, the clerk, and the captain." He returned in a few minutes from below, and, without saying a word of what had happened, and looking as unconcerned as a stranger, coolly presented a £5 note, or \$24 25, and asked for his change. Such is a specimen of the rogueries attempted by

those who have money. Those who really have none at all, or who possibly have not sufficient to pay their passage, resort to other schemes for crossing the Atlantic at a reduced rate, or free of charge altogether, and "stow away." This is a practice which is carried on to a great and increasing extent.

After encountering these perils of poverty and cheating, the crowd becomes finally located on board of ship, and assigned their quarters for the voyage. It is a strange place for the new-comers, and their admiration of the new life they have entered upon begins with the first day's issue of regulation food. The experience of most of them in the edible way, has hitherto been confined to "murphys" or, at most, Indian meal, which they heartily detest as "starvation porridge." They now come to the allowances, as above, handed them by law. The meal, the tea, the rice, the sugar, and molasses prove frequently a puzzler—tea in particular—and it is not unfrequently the case that a brawny Pat, who could do a good turn at Donnybrook fair, but whose knowledge of drinkables is confined to whisky, will, after gravely surveying the tea for a while, deliberately fill his pipe with a portion, and smoke it with much satisfaction. Others, with more expansive ideas, will at times mix the whole in a mass, and boil it into a thick soup or pudding, well specked with the expanded tea leaves. Information comes with experience, however, and the first serious experience is seasickness, which utterly prostrates them, mind and body, aggravating every dirty habit they may have formed. Then is exerted the utmost power of the captain to enforce cleanliness; he usually selects a dozen or two of the more intelligent, and investing them with authority, a general turn-out, and a thorough cleaning every morning, and in all weathers, is compelled.

By the rigid observance of this rule, much of the former sickness and mortality has been avoided. A voyage of some thirty days usually brings the human freight within sight of New York harbor. It almost invariably occurs that in the first delight of arrival every utensil and article of bedding is pitched overboard. No matter how poor are the people, or how hardly the things may have been come by, over they go; and cleaning for the landing takes place. How full of anxieties is that landing!

CHAPTER III.

LANDING IN NEW-YORK—FUTURE HOMES.

THE Castle Garden, at New York, is allotted for the reception of the passengers under the Commission of Emigration, which was organized by law in 1847, and which charges a tax of two dollars per head on each immigrant, applying the proceeds to the support of the needy and destitute among them. The operations of this commission have become very extensive. It has charge of the Quarantine. Since its organization it has raised large hospitals on Ward's Island, where the sick are cared for. They are also sent to the Marine Hospital and the New York Hospital, and they reimburse the towns and counties of the state for the charges they incur for support of poor aliens, and advance money to immigrants on pledge of baggage, without interest. In the year 1859 \$2,180 was so advanced to 162 families, and \$2,031 was paid back. The operations of the commission in 1859 were:—

Receipts for commutation	\$159,112
Other receipts	23,454

Total receipts	182,566
Balance in hand, January, 1859	5,656

\$188,222

Office	\$16,486
Hospitals	6,380
Counties for support	23,555
Castle Garden	34,727
Agent at Rochester	1,087
“ Albany	2,160
“ Buffalo	2,601

Ward's Island	54,890
Marine Hospital	18,360
Floating “	4,647
Forwarding Immigrants, &c., &c.	32,130
Incidental	721
	— \$197,744

This account gives a general idea of the operations of the commission. The whole amount disbursed by the commission, May 5, 1847, to Jan. 1, 1860, was \$834,786. The proportion who go into hospital appears to be about six per cent. of the arrivals.

A large majority of those who here land have their friends awaiting them to guide them to their future homes. Numbers have to seek their way amid numberless perils. But nearly all these have come provided with instructions more or less minute, derived from the numerous agents in Europe of the American land companies, who hold out inducements to settlers. The Germans are mostly inclined to agriculture, and they soon find their way, by the emigrant trains of the great trunk lines of railroads. Those lines have all exerted themselves to profit by the movement.

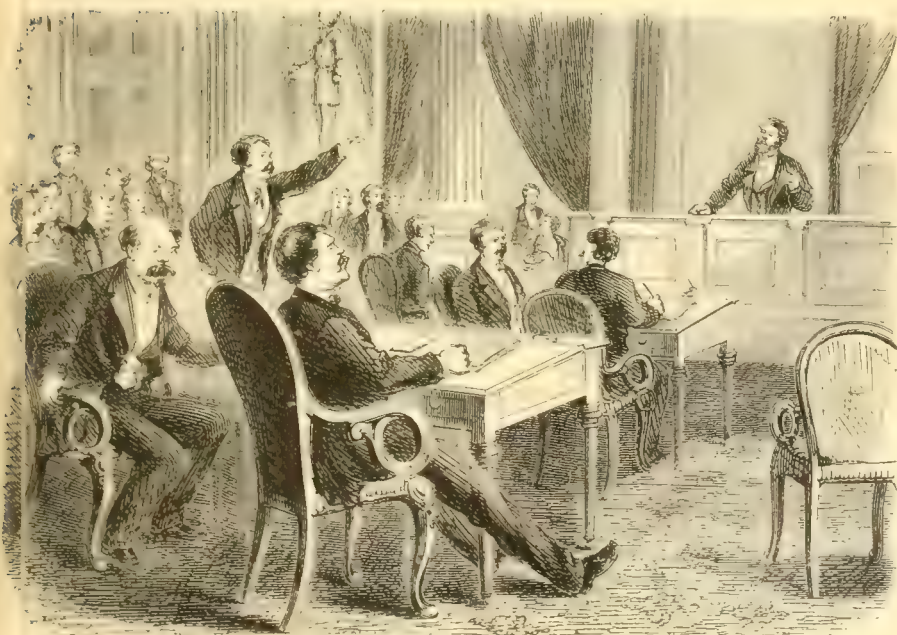
The following table, from official sources, gives the number of Germans and British under each head, and also the aggregate of all the aliens arrived since the returns have been regularly kept. Some of the passengers report themselves from Great Britain, without stating which portion. These are under the head “Great Britain.” Thus, the total from Great Britain to 1859, is 2,670,059, of which, 1,415,399 are reported from Great Britain, 289,654 from England, 918,729 from Ireland, 46,277 from Scotland.

NUMBER OF PASSENGERS THAT ARRIVED IN EACH YEAR IN THE UNITED STATES FROM ENGLAND, IRELAND, SCOTLAND, GREAT BRITAIN, AND GERMANY, WITH THE TOTAL FROM ALL COUNTRIES.

	England.	Ireland.	Scotland.	Gt. Britain.	Germany.	Switzerland.	Prussia.	Total.
1820,	1,782	1,725	268	2,249	948	31	20	8,385
1821,	1,036	1,518	293	1,881	365	93	18	9,127
1822,	856	1,346	198	1,088	139	110	9	6,911
1823,	851	1,051	180	926	179	47	4	6,354
1824,	713	1,575	257	1,064	224	253	6	7,912
1825,	1,002	4,157	113	1,711	448	166	2	10,199
1826,	1,459	3,333	230	2,705	495	245	16	10,837
1827,	2,521	3,282	460	7,689	435	297	7	18,875
1828,	2,735	5,266	1,041	8,798	1,806	1,692	45	27,382
1829,	2,149	3,106	111	5,228	582	314	15	22,520
1830,	733	747	29	2,365	1,972	109	4	23,322
1831,	251	1,647	226	6,123	2,395	63	18	22,633
1832,	944	5,120	158	11,545	10,168	129	26	53,179
1833,	2,966	4,511	1,921	4,166	6,823	634	155	58,640
1834,	1,129	6,772	110	26,953	17,654	1,389	32	65,365
1835,	468	5,148	63	24,218	8,245	548	66	45,374
1836,	420	2,152	106	41,006	20,139	445	568	76,242
1837,	896	737	14	39,079	23,036	383	704	79,340
1838,	157	1,225	48	16,635	11,369	123	314	38,714
1839,	62	1,199	.	32,973	19,794	607	1,234	68,069
1840,	318	677	21	41,027	88,581	500	1,123	84,066
1841,	147	3,291	35	50,487	13,727	751	1,564	80,289



IRISH EMIGRANTS JUST ARRIVED IN NEW YORK.



IRISHMEN IN THE COMMON COUNCIL, NEW YORK

	England.	Ireland.	Scotland.	Gt. Britain.	Germany.	Switzerland.	Prussia.	Total.
1842,	1,743	4,811	24	66,736	18,287	483	2,083	104,565
1843,	3,517	1,173	41	23,369	11,432	553	3,009	52,496
1844,	1,357	5,491	23	40,972	19,226	839	1,505	78,615
1845,	1,710	8,641	368	53,312	33,138	471	1,217	114,371
1846,	2,854	12,949	305	57,824	57,010	698	551	154,416
1847,	3,476	29,640	337	95,385	73,444	192	837	234,968
1848,	4,445	24,802	659	118,277	58,014	319	451	226,527
1849,	6,036	31,321	1,060	175,841	60,062	13	173	297,024
1850,	6,797	40,180	860	167,242	78,137	375	759	369,980
1851,	5,306	55,874	966	210,594	71,322	427	1,160	379,466
1852,	30,007	159,548	8,148	2,544	143,575	2,788	2,343	371,603
1853,	28,867	162,649	6,006	2,703	140,653	2,748	1,293	368,645
1854,	48,901	101,606	4,605	5,141	206,054	2,953	8,955	427,883
1855,	38,871	49,627	5,275	1,176	66,219	4,433	5,699	200,877
1856,	25,904	54,349	3,297	15,457	63,807	1,780	7,221	200,436
1857,	27,804	54,361	4,182	26,493	83,798	2,080	7,983	251,306
1858,	14,638	26,873	1,946	12,372	42,291	1,056	3,019	123,126
1859,	13,826	35,216	2,293	10,045	39,315	833	2,469	121,282
1860,	13,001	48,637	1,613	15,123	50,746	913	3,745	153,640
1861,	8,970	23,797	767	9,938	30,189	1,007	1,472	91,920
1862,	10,947	23,351	657	13,035	24,985	643	2,544	91,987
1863,	24,065	55,916	1,940	40,878	31,989	690	1,173	176,282
1864,	26,096	63,523	3,476	23,856	54,379	1,896	2,897	193,416
1865,	15,038	29,772	3,037	64,390	80,797	2,859	2,627	249,061
1866,	2,770	32,312	672	95,866	110,440	3,323	5,452	318,494
1867,	.....	69,977	.....	55,543	121,240	1,168	12,186	298,358
1868,	11,107	42,747	1,949	51,779	111,503	3,261	11,567	297,215
1869,	55,046	51,290	12,415	28,965	124,766	3,488	22	395,922
1870,	59,488	56,628	11,820	23,153	91,168	2,474	111	376,314
	792,846	2,288,198	128,900	3,230,880	3,723,493	92,609	155,191	7,551,383

We give the following table, compiled from the immigration returns and the census of 1860, because the census bureau has not yet (Jan. 1872) tabulated its returns of this character for the census of 1870. It will be understood that the net difference, 925,329, between the arrivals for forty years, and the residents represents those who have died and those who have returned to their native countries. It is evident that there must have been a very considerable number who came into the country across the lines from British America and Mexico without being reported to the Bureau of Emigration, since the dates of emigrants in forty years should alone amount to more than two-elevenths of the whole number, and it has been ascertained that in those forty years, full 300,000 returned to Europe. We may then with confidence state the entire immigration into this country from 1820 to the close of 1870, as not less than 8,000,000. The deficiency column in the table below, is partly due to the imperfection of the census returns, and partly to the unwillingness of many emigrants to declare on their first arrival their native country. It is noticeable that about one-fifth of the whole number of arrivals reported in the table, were from Great Britain and Ireland.

STATEMENT OF THE NUMBER OF ALIENS ARRIVED IN THE UNITED STATES FROM 1820 TO 1860, BOTH INCLUSIVE, AND THE NUMBER OF EACH NATION RESIDENT IN THE UNION BY THE CENSUS OF 1860.

Countries.	1820	Res. 1860.	Excess of Deficiency to 1860.	Census 1860.	Arrivals of arrivals.
England.....	302,005	431,002	.....	.....	.....
Ireland.....	967,396	1,011,304	.....	.....	.....
Scotland.....	47,900	168,518	.....	.....	.....
Wales.....	7,937	45,763	.....	.....	.....
Gt. Britain & Ireland	1,425,018	1,802	.....	.....	.....
Total.....	2,750,871	2,199,079	551,795	.....	.....
France.....	208,713	109,870	98,183	.....	.....
Spain.....	16,248	4,244	12,004	.....	.....
Portugal.....	2,614	4,116	.....	1,502	.....
Belgium.....	9,862	9,072	790	.....	.....
Prussia.....	60,432	227,661	167,229	.....	.....
Germany.....	1,488,044	1,074,475	411,569	.....	.....
Holland.....	21,579	28,281	6,702	.....	.....
Denmark.....	5,540	9,062	4,452	.....	.....
Norway and Sweden.....	36,129	62,620	26,491	.....	.....
Poland.....	1,659	7,298	5,639	.....	.....
Russia.....	1,374	3,190	1,786	.....	.....
Turkey.....	170	128	42	.....	.....
Switzerland.....	37,733	53,327	15,594	.....	.....
Italy.....	11,202	10,518	684	.....	.....
Greece.....	116	3,8	212	.....	.....
Sardinia.....	2,030	1,159	1,559	.....	.....
Europe.....	723	1,403	877	.....	.....
British America.....	117,142	249,970	132,828	.....	.....
South America.....	623	3,23	2,908	.....	.....
Central America.....	964	233	735	.....	.....
Mexico.....	17,566	27,466	9,700	.....	.....
West Indies.....	4,387	7,353	33,134	.....	.....
China.....	41,433	35,565	5,878	.....	.....
Asia.....	17	1,231	1,062	.....	.....
Africa.....	589	626	194	.....	.....
Azores.....	3,452	.....	.....	.....	.....
Canary Islands.....	283	1,331	2,510	.....	.....
Sandwich Islands.....	79	435	299	.....	.....
Australia.....	169	1,419	1,310	.....	.....
South Sea Islands.....	79	246	243	.....	.....
18 nations not specified,	1,256	.....	.....	.....	.....
Not stated.....	180,854	1,366	179,488	.....	.....

Total aliens..... 5,062,414 4,136,175 1,301,419 876,060
Excess of arrivals..... 925,329

Let us next see where these emigrants make their homes on this side the ocean. Here again we must take the census of 1860 for the details, as the Census Bureau is not likely to furnish those of 1870 for a year or two to come. The larger part of the Irish it will be seen, settled in the New England and Middle States, over 1,100,000 of the

1,600,000 remaining in these States. Of the Germans a large proportion migrated westward and have established themselves in the Mississippi and Missouri valleys, and considerable numbers have gone to the Pacific coast. The Scandinavians have settled largely in the northwest. The "total" column includes emigrants of all nationalities:—

States and Territories.	England.	Ireland.	Great Britain not specified.	Germany.	Prussia.	Switzerland.	Sweden & Norway.	Total Foreign.
Alabama.....	1,174	5,664	5	2,209	392	138	206	12,352
Arkansas.....	375	1,312	8	989	154	42	30	3,741
California.....	12,227	33,147	103	17,002	4,644	1,714	2,120	146,528
Connecticut.....	8,875	55,445	50	7,311	1,214	275	64	80,696
Delaware.....	1,581	5,832	....	997	266	34	8	9,165
Florida.....	320	827	3	404	74	13	42	3,309
Georgia.....	1,122	6,586	....	2,017	455	62	50	11,671
Illinois.....	41,745	87,573	669	106,257	24,547	5,748	11,361	324,643
Indiana.....	9,304	24,495	21	54,638	12,067	3,813	367	118,184
Iowa.....	11,522	28,072	23	30,758	7,797	2,519	7,153	106,081
Kansas.....	1,400	3,888	7	3,788	530	260	345	12,691
Kentucky.....	4,503	22,249	2	24,263	2,964	753	53	59,799
Louisiana.....	3,989	28,207	1	21,875	2,739	878	256	81,029
Maine.....	2,677	15,290	37	307	77	13	101	37,453
Maryland.....	4,235	24,872	....	41,057	2,827	177	55	77,536
Massachusetts.....	23,848	185,434	294	8,479	1,482	335	856	260,114
Michigan.....	25,743	30,049	11	29,152	9,635	1,269	706	149,092
Minnesota.....	3,462	12,831	4	12,423	5,977	1,085	11,603	58,728
Mississippi.....	844	3,893	1	1,691	317	138	36	8,558
Missouri.....	10,009	43,464	114	64,795	23,692	4,585	385	160,541
New Hampshire.....	2,291	12,737	2	322	90	12	25	20,938
New Jersey.....	15,852	62,006	1	30,881	2,891	1,144	153	122,790
New York.....	106,011	498,072	131	227,226	29,036	6,166	2,217	998,640
North Carolina.....	729	889	....	696	69	10	13	3,299
Ohio.....	32,700	76,826	148	151,093	17,117	11,078	136	328,254
Oregon.....	690	1,266	5	856	222	71	99	5,122
Pennsylvania.....	46,546	201,939	14	123,801	14,443	4,404	533	430,505
Rhode Island.....	6,356	25,285	....	728	87	37	71	37,394
South Carolina.....	757	4,906	1	2,595	352	33	42	9,986
Tennessee.....	2,001	12,498	3	3,515	354	566	46	21,226
Texas.....	1,695	3,480	27	14,318	6,235	453	479	43,422
Vermont.....	1,632	13,480	42	205	14	4	1	32,743
Virginia.....	4,104	16,501	32	9,561	564	267	65	35,058
Wisconsin.....	30,543	49,961	24	70,896	52,983	4,722	22,115	276,927
Colorado Territory.....	352	624	1	522	54	25	39	2,666
Dakota Territory.....	35	42	....	22	....	1	129	1,774
District of Columbia.....	1,030	7,258	....	3,025	229	97	17	12,484
Nebraska Territory.....	1,471	1,431	2	1,346	396	228	173	6,351
Nevada Territory.....	294	651	....	388	66	19	57	2,064
New Mexico Territory.....	145	827	1	445	124	27	5	6,723
Utah Territory.....	7,084	278	5	139	19	78	355	12,754
Washington Territory.....	419	1,217	10	483	89	34	55	3,144
Total.....	431,692	1,611,304	1,802	1,073,475	227,661	53,327	62,620	4,136,175

The census of 1870 makes the whole number of persons of foreign birth in the United States in June, 1870, 5,566,546, being an increase of 1,427,849, in the ten years, while the actual immigration of that ten years was about 2,350,000.

The statement of the number of persons of foreign birth in the different states and territories in 1870, reveals some interesting facts. Of the territories Idaho has the large

est population of foreigners, over one-half, while Montana and Utah have each about two-fifths; of the states, Nevada has three-sevenths, Minnesota four-elevenths, California five-fourteenths, Wisconsin a little more than a third, and New York about three-elevenths. Several other states range between one-fourth and one-fifth foreigners. The Southern states, though increasing their foreign population, have not a large share.

The amount of money or capital drawn from Europe by the emigrants is a question of much importance. The cost of preparation for the voyage in Europe, the cost of the passage, and the expenses incurred after arriving until the new home is finally reached, cannot, together, fall short of one hundred dollars each; and many have a small capital in addition, with which to begin the world. The sums transported are often much larger. In 1854 the migration from the Palatinate, as stated in a Bremen report, was 8,908, and they carried \$1,024,000. The reports of the New York commissioners of emigration as the result of their investigation, show that the average of money brought is very near one hundred dollars per head—an amount which becomes formidable when taken in connection with the aggregate numbers arriving. This is exhibited in the following summary of arrivals:—

	Whole No of Arrivals.	Number of Aliens.	Sums at \$100 per head.
ten years to Sept. 30, 1829,	151,633	128,592	12,859,200
" " " 1830,	572,716	534,381	53,838,100
" " " 1840,	1,479,478	1,427,337	142,733,700
" " Dec 31, 1850,	3,075,000	2,814,554	281,455,400
seven yrs to Dec. 31, 1870,	2,856,341	2,451,701	245,170,100
Total.....	8,136,071	7,360,475	735,047,500

This is an immense sum, and poured forth even in small streams, has had an important effect upon the prosperity of the country at large, independent of the larger sums invested in land, stock, and utensils. On the other hand, very considerable sums are sent out of the country in aid of the emigrants, by their friends here, who have earned the money at service and otherwise. On this point, information has from time to time been gathered, of the houses through which remittances are made. These remittances are mostly small drafts, purchased in New York, for sums varying from five to one hundred dollars. The latter sum is seldom reached, however. The remittances of five of these houses, in one year, were as follows:—

		Average amount.
House A, number of drafts,	1,934	\$32,125
" B, " " "	6,108	123,290
" C, " " "	13,425	266,395
" D, " " "	18,175	363,140
" E, " " "	40,542	810,835
Total 5 houses 1 year,	80,274	\$1,595,785

These do not include the large banking-houses, of which there are no returns, but it is said the Baring Brothers alone send

\$2,500,000. The British emigrant commissioners reported in thirteen years ending with 1860, \$56,191,733 sent to the United Kingdom alone, and this increasing amount continued till 1857.

With the renewal, on a large scale, of emigration after the war, the amounts sent largely increased, and amounted to more than \$20,000,000 per annum. This is not now returned to this country as passage money, for nearly all the emigrant ships are owned in Great Britain or in Germany. The United States gold coin exported to England and Germany is bought up to some extent by emigrants, but not as much as formerly. The aggregate amount of money brought here by immigrants in the fifty-one years ending Dec. 31, 1870, was, as we have seen, \$736,000,000. Deducting at least \$236,000,000 for remittances made from this side to the families of emigrants, there still remains the large sum of \$500,000,000 brought here by immigrants, besides their productive labor after their arrival.

The legal rights of the emigrants, after they become naturalized, are the same in all respects as those of the native born citizens, with the single exception that they are not eligible to the office of president or vice-president of the United States. No law can be passed to abridge the freedom of their speech, or the free exercise of their religion, whatever they may be—even the enjoyment of Mormonism has been an attraction to some. Their right to hold real estate is perfect, as is the security afforded to persons, property, and papers, and they may be elected, or may elect to any office except those named.

Another very interesting feature of the passenger movement, although not strictly embraced within the emigration, is the number of United States citizens who annually arrive from abroad. It is not until within a few years that a record has been kept of the number of citizens who go abroad each year, but the arrivals of passengers, not immigrants, is an interesting item.

NUMBER OF NATIVE CITIZENS AND FOREIGN VISITORS (NOT IMMIGRANTS) ARRIVING FROM ABROAD.

	Males.	Females.	Not stated.	Total.
1820-1830,	19,542	3,529	62	23,134
1830-1840,	23,036	7,288	31	34,345
1840-1850,	38,952	12,999	190	52,141
1850-1860,	224,410	36,924	...	261,348
1869-1871,	99,373	52,030	...	151,403

The number of departures for Europe is, however, much greater than the arrivals of passengers not emigrants. For the year ending June 30, 1870, it was: Males, 60,505, Females, 21,408, Total, 81,913. This was about an average year—the departures in 1869 being somewhat fewer, and those of 1871 considerably larger. It would be a very moderate estimate of the amount expended or carried with these outgoing passengers to fix it at \$1,200 per head, and yet this would give \$98,295,600 as the amount of money taken out of the country in a single year by European voyagers.

The numbers of former emigrants who returned home with accumulated means, added to the sums expended abroad by Americans, will probably at least cancel the amounts actually brought into the country by emigrants. But the vast amount of productive skill and labor that is brought into the country, and applied to the vast waste of land, develops more capital in a ratio which astonishes the observer. The number of persons who arrive in the United States in a single year, equals the population of a whole state. Thus the number that arrived in 1870 were 436,496; the total white population of the state of Minnesota was, in 1870,

439,706, and there were nine states which contained a smaller number of population.

From 1859, the tide of immigration, which for two or three years previous had ebbed, began to flow again in something like its old abundance, and, though checked in 1861 and 1862 by the war and the presence of rebel privateers in the Atlantic, it soon increased again, and from 1863 to 1871 has been very large. In 1860, the whole number of alien emigrants was 153,640. In 1861, it was only 91,920; in 1862, 91,987; in 1863, 176,282; in 1864, 193,416; in 1865, 249,061; in 1866, 318,494; in 1867, 298,358; in 1868, 297,215; in 1869, 395,922; in 1870, 436,496; in 1871, 386,271. It is a noteworthy fact that the later immigrants, those of the last six or seven years, are, socially and pecuniarily, of a much higher class than those of former years. A very large proportion of them are well, or at least tolerably educated, and many of them possess sufficient means to enable them to go to the West and procure farms, or engage in other employments. Of the immigrants in 1871, 82,554 were from Germany, 57,439 from Ireland, 56,530 from England, 28,925 from Great Britain, not specified, and 160,823 from other countries.

SOCIAL AND DOMESTIC LIFE.

INTRODUCTORY.

THREE quarters of a century ago, there were in the whole United States only about as many people as there are now in the state of New York; and now we have grown from less than four millions to thirty millions—having increased nearly eight-fold.

These large numbers will indistinctly represent the general progress of the nation; and the average social prosperity of each citizen has increased in a ratio materially larger. The actual amount of this increase in intelligence, wealth, and comfort, cannot be set down in figures, but will be understood as well as the case will permit, from an enumeration of details of improvements in social and domestic life.

There were sufficient reasons for a somewhat uncommonly low average of comfort at the end of the Revolution. The seven years' war had, of course, almost destroyed all industry, except farming and a few indispensable manufactures and trades. It had also drained all the specie out of the country, or frightened it into secret hoards; in consequence of which the currency was entirely disorganized. Government credit was at such a low ebb, that the bills of the United States (known as "continental money") would not purchase even such articles of comfort or luxury as existed, except at enormous nominal rates; nor was the paper money of the separate states in much better reputation. Thus, a hundred dollars in these depreciated bills was paid for a mug of cider; five hundred dollars for a bowl of punch; a thousand dollars for a pair of shoes; twenty-seven thousand dollars for an ordinary horse; and "part of an old shirt" was set in an inventory at fifteen dollars. The worthlessness of this money rendered it necessary to make payments, to a great extent, in barter—a mode of trading which always keeps the average of comfort and luxury down at a standard little above that of the better class of savages.

But even if this paper currency had been worth its face, or if specie had been plenty, it would have been possible to buy only a small share of comforts or luxuries compared with those now attainable, for the plain reason that they did not exist.

Beginning at this low period of average prosperity, we shall now rapidly sketch the progress of the country, up to the present time, under the general heads of

1. Domestic Architecture.
2. Furniture.
3. Food.
4. Dress.
5. Mental culture, intercourse, etc.

CHAPTER I.

DOMESTIC ARCHITECTURE.

Eighty years ago, houses were much more evenly distributed over the country than is now the case. There has ever since been a continual tendency to draw together into towns; and this tendency has been much assisted by the increased ease of travelling and transportation. At that time, therefore, there was much less difference between a country house and a city house than at present.

In the older parts of the northern states, the houses then built were often of the style called "lean-to," or "linter;" that is, with one side of the roof carried down so far as to cover an additional tier of rooms on the ground floor, or a wide shed. Another common style, rather later in use, was the "gambrel roofed," where the roof rose at a very steep pitch from the eaves, about half the length of the rafters, and then fell in to the ridge-pole at a much flatter angle. This gave a very roomy garret. Dormer windows were very common, to light rooms finished off in the garrets.

Timber was plenty, and houses were built

almost exclusively of wood, and often with beams and rafters of dimensions that would now seem truly enormous. Brick was comparatively little used, until lumber grew scarcer in the older parts of the country, and "brick machines," first invented by Kinsley a little before 1800, had rendered the production of brick more rapid and cheaper than could be afforded by hand labor. Stone was scarcely used at all, except by a very few wealthy persons. Sometimes the spaces between the timbers of a frame house were filled in with brick, so as to make a sort of brick body to the house, with wooden bones, and with the clapboards put on over these.

A beam was very often left running across the ceiling of a room, six or eight inches below the plaster, and was a convenient place for driving nails or pegs on which to hang dried apples, seed-corn, peppers, hams, baskets, rope, etc., etc. In like manner the uprights often projected into the corner of the room, giving it a kind of coarse cornice. The centre of the house was usually occupied by the chimney stack—an immense pile of brick or stone, sometimes occupying almost a quarter of the ground plan. In the different sides of this huge mass opened the great old-fashioned fire-places, in many of which one could sit in the corner while the fire burned, and see the sky through the chimney-top. Half a cord of wood might burn at once in some of these great fire-places, and yet, in the bitter cold of a northern winter, water would freeze at the other side of the room. This was by reason of the thinness of the walls, the imperfect fitting of doors and windows, and above all, the great proportion of heat that went off up chimney, and of cold that came down. Hinged to staples at the chimney-back was a crane, with its pot-hooks and hangers, or trammels, to accommodate the machinery of the cook. At one side of the fire-place was the oven—a cave in the masonry of the chimney-stack—and, usually, with an ash-hole underneath it. A great shovel, or "slice," with a handle five or six feet long, and a big pair of tongs to match, were for oven use; and to heat this affair thoroughly enough to bake bread, usually occupied an hour or an hour and a half, and consumed two or three good armfuls of dry wood.

Houses were commonly low "between joints," to economize heat. Roofs were shingled, with split shingles; the sawed

shingles being little used until a little after 1800, from which time many patents for shingle sawing were taken out. A machine for getting out shingles was patented, however, as early as 1797. Slate roofs were not much used, and tiles scarcely at all. Cypress wood is used for shingles at the south, instead of pine; exposure to the weather turns it to a distinct, but disagreeable black. Sheet tin has been extensively used for roofing, but very often leaks badly from the rusting, expansion, and contraction of the tin. Since 1840, oiled or tarred canvass, asphalt, asbestos, mineral paint, tarred felt or paper, heavily coated with gravel, etc., have been used in place of shingles, or tin, and some of them with good success. Since the introduction of the Mansard or French roofs, slate is more used, and recently enameled sheet iron, imitating slate, has become quite common.

A modern invention in domestic architecture is the plan of building what are called "gravel walls," by moulding gravel and loose stone with mortar, into a kind of concrete wall on the spot, lifting up the moulding cases when the contents are firmly set, and moulding another section. This results in a house which may be said to be of one stone, for if the materials are good, and well put together, they harden into an artificial breccia. This plan has not, however, been sufficiently proved; and a wrong choice of sand, gravel, or lime has often caused the crumbling and ruin of the whole fabric.

Walls were usually finished inside with white-wash, paper, or paint; the use of stucco, or "hard finish," being rare until within the past thirty years. All house iron-work and trimmings of a better kind were imported from England, until within the present century. Wrought nails were used; cut nails having been invented, and their manufacture variously perfected by several Americans, from about 1791, when the earliest patent on the subject was issued, down to the present time. Jacob Perkins, of Newburyport, and Byington, of Connecticut, were two of the most prominent inventors in this line. Such latches, hinges, etc., as were then made in this country, were wrought iron, and clumsy and inconvenient. All these trimmings are, however, now manufactured to great perfection in our own workshops. Among the improvements of the last forty years in house trimmings, a convenient one is the introduction of weights running over



ullies, to facilitate opening and shutting windows. Before these were used, the practice was to use various kinds of catches, all of which made it necessary to lift the whole weight of the sash; and instead of which were often found merely a wooden button to turn under, and hold the sash open, or even nothing but a stick to hold it up.

The invention of the planing machine, first successfully introduced by William Woodworth in 1837, though many patents had preceded his, and of the circular saw, first patented by Cox, of Georgia, in 1795, were important improvements in dressing lumber, and cutting it; as the former could turn out boards smoothed, tongued and grooved, and fit for flooring, and the latter could cut thin work much more cheaply than a common saw movement. Another machine has been introduced since the year 1840, for boring auger holes, and others for cutting wooden mouldings, which save much time and labor in framing and in finishing respectively. During the last twenty-five years, also, various new paints have been introduced, none of which, however, have entirely superseded the old-fashioned oil vehicle and ordinary mineral colors. Of these, the principal are preparations of zinc, to be used instead of lead, and also for a variety of browns and grays; and several "mineral paints," usually finely pulverized stone, which are recommended as good defences against fire.

The improvement of the last twenty years in architectural designs has been great. Up to that time, dwelling houses were built in the north most frequently on a plain parallelogram plan with the common ridge-pole roof. A style at that time quite frequently adopted for houses of a somewhat pretentious character was that of a Greek temple, usually with a row of pillars across one end. This absurd misapplication did not flourish long, and was succeeded by the Gothic cottage style; and this again, and with extensive and well deserved success, by the various modifications of the Italian villa style. In cities where land is very expensive, two styles largely prevail; the English basement house in which the ground floor is occupied by a library or reception room, and a dining room; the kitchen, store-room, and cellar, being in the basement, and the parlors and bed rooms on the second and third floors; and the "high stoop basement," almost wholly above ground, containing the dining room, kitchen,

&c., with cellar beneath. The first floor is occupied with the parlors and boudoir, and the bedrooms are above. The latter is the better of the two, but both require ascending and descending too many flights of stairs, unless Bridget is allowed to reign supreme in all parts of the house. Vestibules or recessed entrances are almost universal in these houses.

A very common arrangement of old-fashioned houses was to set the house with the side toward the street, with the front door in the middle, opening into a little vestibule. From this the stairs passed up, often turning round three sides of the vestibule; and at each side a door led to two front rooms. These, often occupying all the ground floor of the two-story part, were parlors, or a parlor and a bed-room. Behind these, under the "lean-to" roof, was very probably one long room, used as kitchen, nursery, and sitting-room; for the parlor was used only for great occasions. The second floor was laid off as might be convenient.

The better houses of the southern states were built to suit the different demands of the climate—more airy, and usually with much piazza room, and not much provision for warmth. Early settlers in the south and west invariably put up log houses, whose chimneys were built outside against one end, of sticks laid in clay. A mode often used was to build two separate square rooms of logs, and then to throw one roof over both and the space between, thus securing an outdoor shelter. These log houses were floored with "puncheons," that is, small logs split once and hewed even. A standing table of puncheons, some three-legged stools, a rude bedstead, with a bed of leaves or corn-husks covered with buffalo-hide or bear-skins instead of sheet, blanket, and coverlet; a shelf, and a variety of pegs driven into the wall, completed almost the entire outside and inside of these rugged, but comfortable homes, the nurseries of so many brave and great men. In such houses were born and brought up Andrew Jackson, Henry Clay, and the numberless heroic Indian fighters and mighty hunters of the west. And such houses are still the homes of thousands of the bold pioneers who are advancing westward, carrying forward the limits of civilized society toward the Pacific ocean. As the newer states increase in population and wealth, the domestic architecture of the older ones is copied, and dwell-

ing houses of the same general character are now commonly used in city and country.

Among the chief improvements in domestic architecture are those which have been applied to modes of warming houses. The earliest improvement on the ancient fireplace was the Franklin stove, invented by the great philosopher whose name it bears, and which was in use before the revolutionary war. These were only shallow iron fireplaces, with a draft which could be modified by a sort of valve, and were used only for wood. Large box-stoves, also for wood, were the first means used for warming churches. Even these were not introduced until within the memory of many persons now living, and, as is well known, were violently resisted by the conservatives, who fought hard to retain the privilege of mortifying the flesh by freezing fingers and toes all day Sunday.

The introduction of anthracite coal was the next step in this department. This had been known for years to the hunters and trappers of the wild interior of Pennsylvania, as a black stone sometimes found on the mountains, but was not thought combustible, any more than granite.

Some successful attempts had, however, been made to burn anthracite; one by Dr. C. T. James, in 1804; and one by Judge Jesse Fell, of Wilkesbarre, who burned it in a grate, in 1808. This brought it gradually into use in that vicinity. In 1814, White & Hazard, iron-masters in Carbon county, bituminous coal becoming scarce, resolved to try anthracite in their rolling mill. They got a cart-load, at a dollar a bushel, and wasted it all in vain endeavors to kindle it. Procuring another load, they tried again; but after fruitless endeavors for a whole night, the hands shut the furnace door in despair and left the mill. Half an hour afterward, one of them came back after his jacket, and to his surprise found the furnace door red-hot, and the inside at a strong white heat. The discovery was made; and with the use of a similar let-alone policy in kindling, anthracite was afterward used in furnaces with entire success, an improvement in quality of product, and a large saving of expense.

Thus introduced, the use of the new fuel gradually spread, although so slowly that in 1820, three hundred and sixty-five tons completely stocked the Philadelphia market for a year. Many patents were now taken

out for grates, blowers, cooking-stoves, parlor and hall stoves, ranges, and hot-air furnaces. R. Trexler, of Berks county, manufactured stoves for anthracite in 1815; and the earliest patent for furnaces seems to have been that of Thomas Gregg, of Connellsville, Pa., in 1814. Three or four years now brought the new fuel into extensive use, and from the three hundred and sixty-five tons, which was all that was mined in 1820, the amount had risen in 1849, in thirty years, to 3,250,000 tons, and to 12,211,313 tons in 1870, together with nearly an equal quantity of bituminous coal.

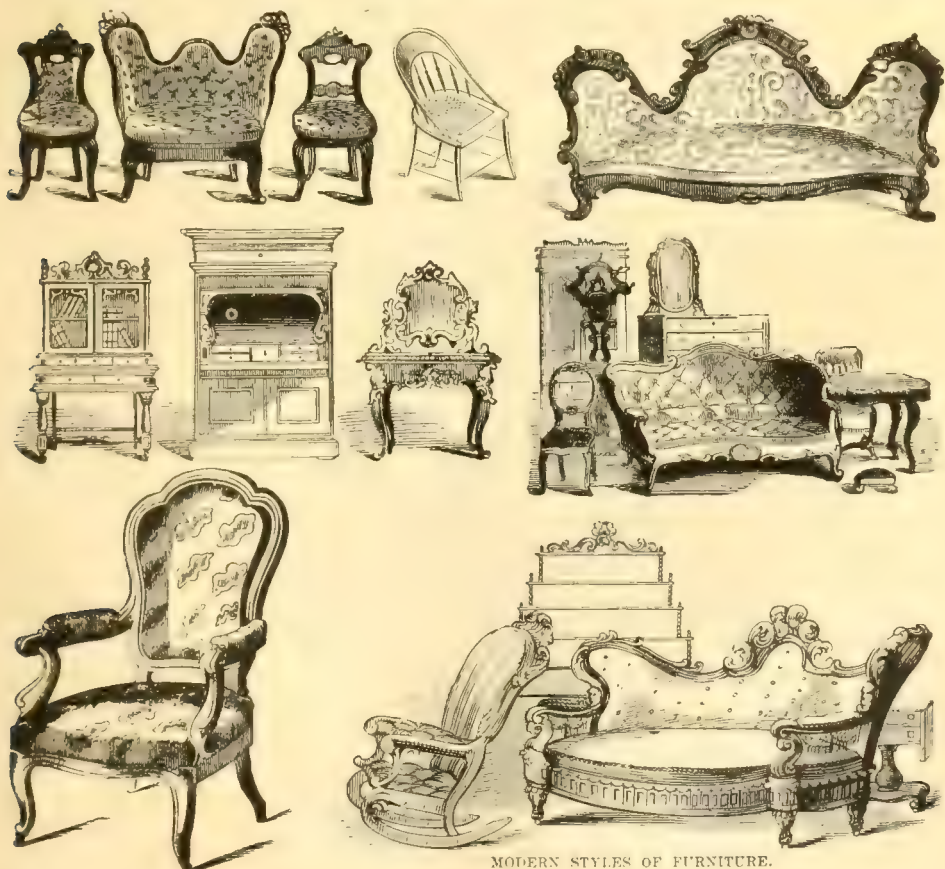
Nott's stoves were early much used for warming houses with anthracite; Olmsted's stove and Bushnell's were in fashion next; the first invented by a college president, the second by a college professor, and the third by an eminent clergyman. These have been superseded by the base-burning stoves and furnaces, of which there is a variety. About the year 1836, Isaac Orr, a man of great inventive talent, patented the air-tight stove for wood, which was for a time so extensively used as to cause a sort of interregnum in the reign of anthracite, and which is yet frequently seen. Grates, long used in England to burn the bituminous coal there, were early adapted to anthracite, and their cheerful open appearance has kept them to some extent in vogue. Hot-air furnaces were also invented, as early, at least, as 1813; but various faults, from the too great fierceness and dryness of the heat, imperfect defence against fire, etc., rendered them on the whole quite unsatisfactory, until about 1840, when great improvements began to be made; and many of the furnaces now employed afford a bountiful supply of air, almost fresh from out-doors, and not too warm and dry for health.

Apparatuses have also been devised for heating buildings by systems of hot-water pipes, and by systems of steam pipes; of which the latter, especially in manufacturing establishments, offices, public rooms, etc., succeed very well, though the heat would sometimes be somewhat too slowly diffused for private residences.

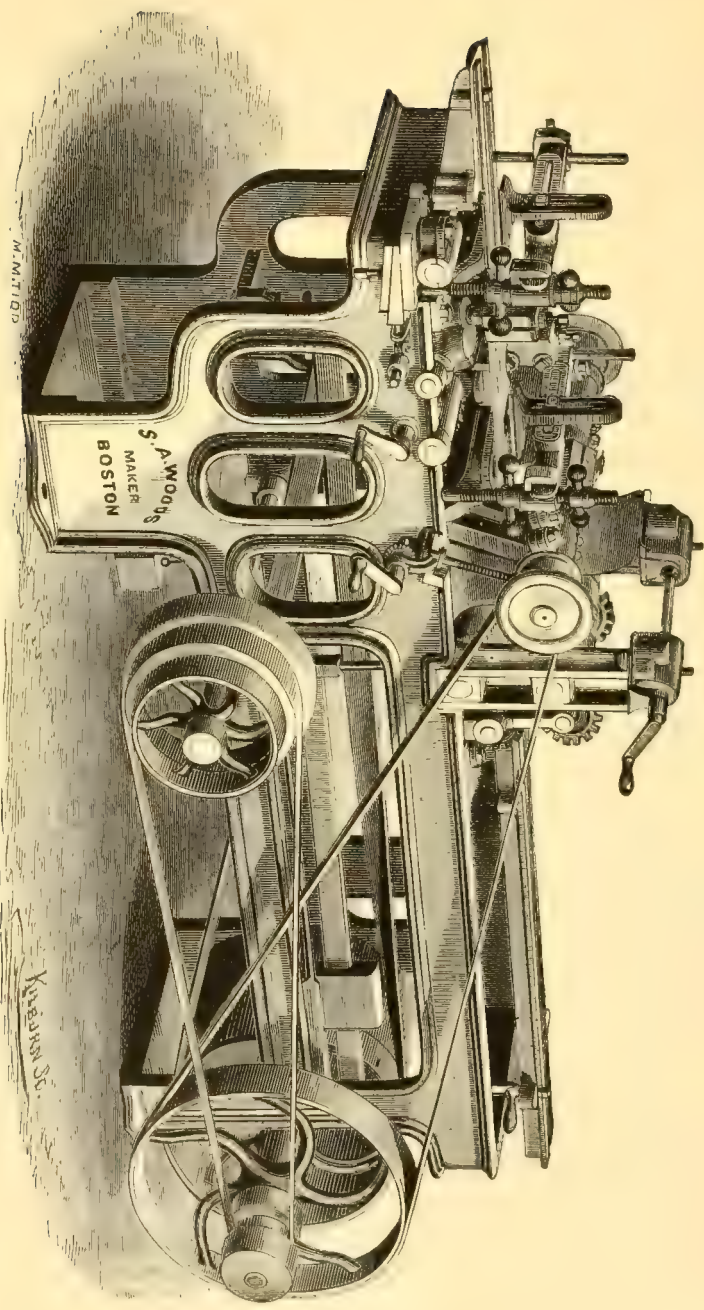
Until within twenty years, scarcely any care had been given to the ventilation of any buildings, whether public or private. At earlier periods, an abundant circulation of air was secured by the open chimney, through which a strong current of warm air continually rushed up, taking, as has been



STYLE OF FURNITURE FIFTY TO ONE HUNDRED YEARS AGO.



MODERN STYLES OF FURNITURE.



WOODS MOLDING MACHINE.

computed, at least nine-tenths of all the heat with it. With the introduction of stoves and furnaces, this ventilator was closed, and the air of warm rooms became unhealthily dry and hot, or vitiated by use, especially in schools, ball-rooms, court-rooms, public assemblies, etc. Many disorders were aggravated or made more common by this state of things; such as headaches, nervous affections, and lung complaints. Various plans of ventilation have been adopted to remedy these evils, but the principles of the science of pneumatics are even yet so imperfectly understood that no entirely satisfactory system of ventilation has yet been devised. The modes formerly used for large public buildings, such as churches: an opening at the ceiling, with a device outside for forming an upward current by the help of the wind; in private houses, openings at the sides of rooms, communicating indirectly with the external air; and where hot-air furnaces were used, a pipe supplying air from without, which is warmed by the furnace, and passed on into the apartments, are now to a considerable extent giving place to a forced and downward ventilation, which more effectually removes the foul air, and avoids a current of cold air near the floor.

The use of gas for lighting streets and houses was first invented by an Englishman named Murdoch, and tried at Redruth, in Cornwall, in 1792. It was first introduced in the city of New York by the old New York Gas Company, chartered in 1823. It is now used in most of our cities, and its deprivation would be thought a very serious misfortune.

An equally, and indeed much more labor-saving and convenient improvement in our modern domestic architectural arrangements, is the introduction of water from water works. Water works were commenced in New York before the Revolution, in 1774; but none were erected there until 1797, when the Manhattan Company put up a reservoir on what is now Chambers street. These small works were superseded by the Croton aqueduct, opened in 1842. Philadelphia was first supplied by a steam engine in 1799; and this was replaced by the celebrated Fairmount works, commenced in 1811. Almost all our larger or more enterprising cities are now provided with aqueducts.

The fountains thus set flowing in our

houses save all water-carrying, for bathing or cleaning purposes, either up or down stairs; for a proper connection with a sewerage system will admit of a sink as well as a water pipe in every story. The burdensome daily details of housework are thus very greatly lightened, and health, and time, and exertion very much economized by the various appliances of the modern city bathroom.

Within fifteen years, there have been introduced into many of the more luxurious city houses, hoistways, somewhat like those used in stores, but upholstered, and, in fact, fitted up like little rooms; these are raised and lowered so as to save the exertion of using the stairs, and are exceedingly convenient for the old and feeble.

This brief enumeration of improvements in domestic architecture could not properly include what may, however, in conclusion, be merely mentioned; that is, those large and splendidly finished houses which are erected by the great millionaires of the present day. The costly frescoes, the statues, the extravagant splendor of their fitting, the picture-galleries, conservatories, libraries, etc., etc., though good and beautiful in themselves, are exceptions, but have been greatly multiplied within the past fifteen or twenty years.

CHAPTER II.

FURNITURE—FURNISHING GOODS, ETC.

THE furniture of country dwellings during the latter part of the last century was scantier than now, and, on the whole, of much cheaper quality and poorer make, although that of the wealthy was often handsomely designed, well and massively made, and heavily and tastefully ornamented. Little machinery was used in manufacturing furniture, which had, therefore, to be made by hand labor. This made patterns more numerous, as one design usually served for a single side-board, set of chairs, etc., and for those made by one workman only; while now, one pattern may serve for thousands of sets. There was, therefore, greater variety, and often remarkably fine workmanship, and even artistic skill. The greater cheapness of wood, and the little use made of veneering, occasioned much furniture to be made of solid wood. Many pieces of this ancient,

solid furniture now bring extravagant prices at auction, or from a second hand store, where chance supplies a buyer with taste and means. As much as forty, or even sixty dollars each have been given for old-fashioned, carved, mahogany chairs; from twenty-five to fifty dollars for a tall clock, etc., etc.

The increase in the supply of money, the decrease of any distinction between classes of society, and the general diffusion of wealth and comfort, render the difference between the furniture of the rich, and that of the poor, much less at the present day than formerly. Comparatively few luxuries of any kind are now accessible to the rich, which are not so to the farmer and the mechanic. This is not, of course, to be understood of the very poor, nor the very rich; nor of the most expensive luxuries; for Gobelin carpets an inch thick, marble statues, and pictures by great artists, Johannisberg wine, Strasburg pies, and the like, can never be possessed except by very few.

The bedsteads of our grandparents and great-grandparents were very commonly "four-posters;" that is, they consisted of four tall posts, into which were framed the side and end pieces. These posts often supported a wooden frame covered with cloth, somewhat like a roof, and called a "tester," from whose four sides hung down the curtains. Feather beds were universally used. Sheets were of linen; and coverlets of patch-work, marseilles, chintz, etc.

Carpets were comparatively little used; most people contenting themselves with a floor, washed clean, sanded, or, at most, painted. The carpets used eighty years ago were mostly English or Scotch ingrain, though a good many home-made rag-carpets were also used; and the price per yard was, perhaps, \$1.50 to \$1.75; not varying very much from the present price of a fair article, though the same sum represented more value then. There is a well-known anecdote of an honest old farmer who was one day introduced, for the first time, to a carpeted room. The carpet, as was usual in those days, was a sort of patch in the middle of the room, surrounded with a wide margin of bare floor. The visitor skirted cautiously along the sides of the room, and when invited by the lady of the house to walk across, excused himself with rustic politeness, because, he said, "his boots were too dirty to walk on the "*kiverlid*."

Chairs were of hard wood—maple, oak, cherry, or mahogany—with seats of wood, basket-work, or cushion, covered with cloth, haircloth, or leather. Much skill and taste was expended on many of the costly solid mahogany parlor chairs, and they are even now much more stately than most of their modern successors. The rocking-chair—a truly American invention—dates back to a point not ascertained, but certainly not less than seventy or eighty years ago. No rocking-chairs of so antique a pattern as common chairs can, however, be found. An early improvement upon the old-fashioned wooden or wicker chair-seat was the straw-seat, of straw or rushes, woven together in four compartments, which converged to the middle of the seat. The cane-seat, woven like fine basket-work of slender strips of ratan, came afterward, and is still much used; it is strong, neat, light, and convenient. Many business and study chairs are now made with the seat pivoted on a stout iron pin—a very convenient invention, rendering it very easy to turn round from writing desk to customer or client.

Tables were made of oak, pine, cherry, black walnut, and mahogany. In old-fashioned houses may sometimes still be seen a small table hinged to the wall at one side, so as to turn up flat against it, secured, when not in use, by a button. A leg hinged on beneath hung flat to the table when thus raised, and swung to its right place when lowered. Some old tables were enormously heavy, framed almost as strongly as a house, and with curiously complicated swinging legs to hold up the leaves. Such tables were often heirlooms, as was much household furniture. The substantial strength and solid materials used rendered it much more fit to serve generation after generation than the lighter and cheaper articles now made. The present "extension tables," which are frequently used in dining-rooms, were first patented in 1843; they draw out within certain limits to any length, when additional boards supply the top. Thus the same table accommodates either a large party or a small one.

The sideboard was an indispensable article in dining-rooms where it could be afforded, being used instead of a closet, to hold plate, wine, table-linen, cake, etc.

Bureaus, or chests of drawers, were made on a larger scale than now, sometimes towering far toward the ceiling, containing a

great number of drawers, large and small, and often ornamented in a peculiar and striking manner at the handles and keyholes, with brass escutcheons elaborately and fancifully pierced or carved.

The movable wash-stands, though still in use, have been replaced in many city houses, where aqueduct water in pipes is used, by fixed stands, usually fitted with elegant marble tops, having fixed basins sunk in them, faucets for water, and connecting by waste water pipes with sewer. A "water-back," or boiler, attached to the kitchen range or stove, is so arranged as to supply hot water through pipes, from which another faucet supplies hot water as desired—a most comfortable provision in cold weather.

China and glass ware were much more costly than at present; pressed glass, now so extensively used, having been introduced only within the present century. Pewter platters and plates were frequently the only dishes on a country table. Table crockery was of white stoneware, usually blue-edged, or of the "willow pattern," though some heavy china was imported. There was little silver ware, but what there was, was more solidly manufactured than that now in use. Block tin was much used until finally superseded by Britannia metal, which came into use about forty years since; "albata," a sort of white metal, introduced within about twenty-five years, and German silver, an invention dating back, in this country, about twice as far. A still later substitute for the precious metals is "oreide," a sort of brass, very closely resembling gold; and another, discovered within the last fifteen years by a French chemist, is aluminum, a light, strong metal, resembling silver in appearance, which can be extracted from common clay, and other aluminous earths. This last metal, with its alloys, has already come into very extensive use, for household as well as other purposes.

Silver forks were first brought into general use about thirty-five or forty years since. Those previously used were the common three-pronged steel forks, or two-pronged ones, either of them sufficiently inconvenient for carrying loose food to the mouth. Another improvement, about as old, in table furniture, is the invention of balanced knife handles, the weight in the handle keeping the blade off the table cloth when laid down; a little thing, but very promotive of cleanliness.

Instead of the modern Yankee clock, the first patent for which was taken out by Eli Terry, of Plymouth, Conn., in 1797, were used either small Dutch clocks, stuck up on the wall, like a swallow's nest, or the old-fashioned tall clocks, in cases seven feet high, which were sometimes very handsomely ornamented with carving, brass decorations, and richly painted dials. On the broad faces of these old clocks were sometimes given, besides the hour and the minute, a whole almanac of indications: the time of high tide, moon's age, day of the week and month, name of month, year, etc., etc. Occasionally, a wooden bird came out and was supposed to sing, or a tune was played when the hour struck. A considerable number of these old clocks, most of the best of which were made during the first quarter of this century, are still in use, and they are often excellent time-keepers.

These observations do not include the Mississippi valley, which was just beginning to be settled by Anglo-American pioneers at the close of the revolutionary war. In all that extensive region, the rudest substitutes for all the supposed indispensable instruments of civilized life were used. Furniture, indeed, scarcely existed. A bedstead and a table, rudely hewn out by the sharp axe of the master of the house, some stools of the same manufacture, a shelf, a row of pegs in the log wall, an iron kettle, which often served in its own proper person the various purposes of wash-basin, cooking-kettle, soup-tureen, slop-dish, dish-pan, swill-pail, and hog-trough; a few tins, or a little crockery, a chest or two, a stump hollowed at the top for a mortar to pound corn, and a stick for a pestle—such was the scanty furnishing of that day in that region. As the population has increased, it has brought with it from the older states all their improvements, and now no distinction can be found between the two sections—at least, so far as concerns those of moderate or liberal means.

Lamps, for oil, or candles of tallow, sperm, or wax, were the only means of lighting either rooms or streets, eighty years ago. A great amount of ingenuity has been expended on lamps; a hundred and thirty-seven patents for them having been issued from 1798 to 1847, and quite as many more since that date. The variety of these, and of the substances to the use of which they

are adapted, is remarkable. There are yet some families which make their own mould or dip tallow candles; but only a few. Those who still use candles, mostly, either indulge in the costly luxury of wax or sperm, or use some of the various lately invented substitutes, introduced within twenty or thirty years, such as the so-called "margarine," "stearine," etc., made from lard, or the more recent "paraffine" candles, of a material extracted from coal or petroleum. The first innovation upon the old-fashioned custom of using oil lamps—not, however, including in this term the Argand and similar modifications of it—was the introduction of lamps for the use of burning-fluid and of camphene, which were preparations of oil of turpentine and alcohol, and though neat and convenient to use, and giving a pleasant light, were, in careless hands, the occasion of a terrible number of deaths and maimings by burning. These fluids were in general use during more than twenty years. Not long after the introduction of camphene, a large number of lamps were invented for burning lard oil, then just beginning to be manufactured, and also lard, tallow, and other gross animal fats. About thirty patents were issued for lard lamps alone, during 1842 and 1843, including lamps of the common standard style, argand and solar patterns, etc. These lamps, in some cases, gave a very good light, but it proved troublesome to light them during cold weather, and they required much greasy work in cleaning, etc.

During the last twenty years, another class of illuminators has come into use, and are now almost universally used where there is no gas. These are the various oils known as coal oil, kerosene, astral oil, etc., etc., distilled or purified from the crude petroleum of Western Pennsylvania, West Virginia, Ohio, and Canada; the heavy oil from these wells, and from the shales and fatty coals being used for lubricating purposes. They require a chimney for burning, and are apt to smoke. The odor of the oil when exposed to the air is unpleasant, but when burning is not generally offensive; but many of them are explosive, not being properly prepared, and thousands of deaths have been caused by their careless use.

Improvements in furniture are gradually introduced, and in a manner which renders it peculiarly difficult to fix precise dates. It

may be said in general, that the uniform tendency has been toward lightness and convenience of form. The artistic beauty of the designs has also of late years greatly improved.

CHAPTER III.

FOOD—COOKING, ETC.

THE general character of the food, drink, and cooking of three quarters of a century ago, was not very different from that of to-day. Meats were the same, but less fresh meat was eaten; salt beef, salt pork, and bacon being the ordinary meat, and the beef and pork barrel being almost as universal and necessary in the household as the flour barrel. The common vegetables were potatoes, turnips, cabbages, and onions, with a few beets and parsnips. Carrots were scarcely used at all. At the south, sweet potatoes were, as at present, used in place of Irish potatoes, and okra, rice, etc., were also cultivated as at present. Tomatoes were scarcely known at the north, until about 1830 or 1835, when they were occasionally brought from the south, and gradually began to be cultivated, under the name of "love-apples." The egg-plant, spinach, cauliflower, broccoli, and other kitchen-garden plants, have also been introduced since the beginning of the century, from abroad.

Bread of rye, "rye-and-Indian," or Indian meal alone, and Indian puddings, johnny-cake, and the like, were more used than at present; for most grinding was done at the small country mills; transportation was slow, difficult, and costly; neither the great wheat fields of the east, nor the greater ones of the west, were yielding their increase; and the great flouring mills that are supported by them had not grown up. Every farmer's family, therefore, commonly used breadstuff of its own raising; and but a very small share of that used in the towns was brought from any other than the immediate neighborhood.

All the labor of preparing the raw material for food was performed in the family. All the coffee had to be burnt and ground, spices pulverized, salt powdered, yeast made, soap manufactured, meat pickled, etc., etc., by each housekeeper for herself, or under her immediate supervision.

Throughout the extensive western forest frontier, a large proportion of the inhabi-



KITCHEN OF 1770.



KITCHEN IN 1870.



1776.



EVENING DRESS. 1780.



1780.



1785.



EVENING DRESS. 1795.



EVENING DRESS. 1797.



1800.



1805.



1805.



1812.



1812.



1812.



1815.



1818.



1820.



1825.



1828.



WINTER DRESS 1833.



1833.



1833.



1833.



1840.



1844.



1850.



FASHIONS FROM 1850 TO 1860.



PLAIN DRESS OF VARIOUS PERIODS. EXTREME FASHIONS OF 1868-9.

tants lived in great part upon game; but this was, from the difficulty of transportation, even less accessible in the older settlements than now, when it must be brought from the distant lakes, and streams, and woods of Canada or Maine.

The use of spirituous and malt liquors was universal. It was thought no impropriety for distinguished clergymen to own a share in a distillery; and the meetings of ministers on religious business were made occasions of jollity, often even to such an extent that the reverend companions went home quite tipsy. Cider was drank in the country, and cider, rum, brandy, or wine in town, at every meal. Spirits were expected to be offered to every visitor, and if not, the host was thought mean and stingy.

Cooking was performed over an open wood fire; a mode in many respects more laborious and less convenient than the present use of stoves and ranges; but which, if skilfully conducted, gives the food a flavor more perfect and delicate than can be attained in any other manner.

As has been implied, the changes in food have thus been more in the treatment than in the materials of it. The chief of these changes, like those in warming houses, have arisen from the introduction of anthracite coal into use, which has caused the employment of cooking-stoves and ranges, instead of the open fire. Nearly four hundred patents for cooking-stoves and ranges were issued from 1812 to 1847, and a much greater number have been granted since; the total number of such patents may safely be estimated at more than twelve hundred.

An early style of cooking-stove, and quite a favorite one in its day, was the rotary, whose top could be swivelled round by a crank and cog-wheel geared to a ratchet underneath its edge, so as to bring any sauce pan or kettle forward to the cook. This variety is, however, now nearly obsolete, and innumerable later inventions have succeeded, each enjoying a brief reputation, usually conferred rather by diligent advertisement than by any real peculiar merits in the stove itself.

The cooking range may be described as a modified stove bricked into a fireplace, instead of standing out in the room. Its oven, instead of being back of the fireplace, as in a stove, is above it, or at the sides. Sometimes there are two, besides a plate warmer, and generally they are much more capacious

than a stove oven. They are now, wherever there are water works, usually constructed with a water back and boiler of copper, or galvanized iron. The use of stoves and ranges has rendered cooking more convenient, but has, in a great measure, substituted the baking of meats in the oven for the old fashion of roasting. They are far cheaper and easier in management than an open fire; and in all the older portions of the country are necessary, because wood could not be furnished to supply the kitchens.

CHAPTER IV.

DRESS.

IN discussing the changes of costume since the revolutionary war, it will be more convenient to divide it with reference to female than to male costume. On this principle, the period from 1783 or thereabouts may be divided into five, thus:—

1. 1783 to French Revolution.
2. French Revolution to 1815.
3. 1815 to 1830.
4. 1830 to 1845.
5. 1845 to present time.

Speaking generally, the changes thus succeeding each other have been improvements; although almost all of them have been sufficiently absurd in themselves. These fashions have always come from England or France; since about 1815, almost entirely from France.

1. *Period first, 1783 to French Revolution.* At the close of the Revolution in 1783, the costume of gentlemen was in the English style of the day, viz.: a single-breasted low-collared coat of broadcloth, commonly of some gay color, often scarlet, bright blue, claret color, peach-blossom, with full skirts, and ample pocket-flaps, sleeves, and cuffs; a waistcoat, with long flaps; knee-breeches, often also of gay colors, fastened at the outer side of the knee with a buckle; long stockings, black, white, or colored; shoes with the well-known showy buckles, or boots with a broad piece of white or unstained leather turned down around the tops, and therefore called top-boots; a ruffled shirt, a lace cravat, powdered hair, a queue, not unfrequently a wig, and a three-cornered cocked hat. A very few aged men still wear or have worn this costume within the last ten years, even to the queue and the shirt-frill. The cocked

hat did not maintain its place so long, though quite often to be seen during the first quarter of the present century.

The formal stateliness of this old costume suited well the more careful manners and stiff politeness of the day; for even in our republican country, the distinctions of social rank and station prevailed to an extent which few people now realize. Old persons now living can remember when "Mr." was a title considered exclusively proper for the "gentry;" when a "gentleman's" son would have been reproved by his father for calling a farmer "Mr." A farmer or mechanic was called "goodman," and his wife not "Mrs." or "mistress," but "goody."

Female costume was on the whole, perhaps, less strikingly different from that now in vogue, except in head-dress. Its other most distinguishing characteristics were high-heeled shoes, often of bright red or other strong colors; sleeves to the elbows, with heavy lace ruffles; a tight, close, long waist, and a skirt stiffened out by hoops very nearly as much as by the "skeleton skirts" recently in use.

The head-dresses, then fashionable, were however, most monstrous, and furnished an endless theme for satire and jest. The hair was greased, and powdered, and "craped," as it was called—that is, combed up over artificial hair, a mass of tow, or a cushion; artificial flowers were worked into it, broad ribbons hung around it, feathers three feet high stuck into it, all sorts of vegetable-looking leaves and even fruit and vegetables themselves (imitated) were piled on, and a mass constructed which it seemed totally impossible for a lady's neck to uphold or endure; which was often, literally and truly, quite as large as a bushel basket. A caricature of those days represents a lady sitting in a chair during her head-dressing, while one barber, mounted on a tall pair of steps, is frizzling a curl, and another stands off at one side, taking the altitude of the edifice he has helped to build, with a quadrant. Calashes, whose gig-top appearance almost every one may remember to have seen, were invented long before this time, as early as 1765, as the only contrivance in the nature of a bonnet which would cover these vast machines. Such head-dresses required great skill in preparation and adjustment, and could, of course, not be made up by the owner herself. It was the business of the barber, and often occupied two or three tedious hours. The

idea of going through such an operation daily was out of the question, and these "heads," as they were called, were made to last sometimes for weeks together. Indeed, they were continually corrupting, even so that worms bred in them, among the flour used for hair-powder and the pomatum; and numerous recipes were in use for poisons to prevent vermin from breeding in them. Sleeping in the natural posture was, of course, impossible; ladies slept sitting up or with a carefully arranged support for the neck and head, adapted to the precious mass of absurdities that crowned it.

Period second, French Revolution to 1815. The French Revolution may be called the conclusion of the era of those strange fashions. The freedom of that period, so licentious in politics, was equally so in dress, and in this department, as in the other, caused many and great changes both at home and abroad. In this country, which had before that time followed the English fashions almost exclusively, those of France now began to take the lead, and the ancient caprices of dress to be replaced by others more modern, but not less absurd.

From about 1780, down to about 1800, women's skirts grew more and more scanty in circumference, until they were "gored," and cut so close as to almost impede walking. The waist was also carried up sometimes to one inch below the arm-pit, and the neck at the same time cut indecently low. The skirt was fitted closely to the figure, no wrinkles being admissible, and the fewest possible underclothes were worn; a fashion both abominably ugly and very unhealthy. These ungainly waists excited much deserved ridicule. A well-known song beginning—

"Shepherds, I have lost my love—
Have you seen my Anna?"

was parodied so as to apply to them, commencing with—

"Shepherds I have lost my waist—
Have you seen my body?"

The variations in bonnets and head-dresses during this same period were many and wonderful. In 1786, women wore their hair frizzed and powdered; and for riding costume, a man's jacket with broad lapels, and a broad-brimmed hat. In 1789, the hair was frizzled out into an enormous bush, sometimes with a quantity of dangling curls besides; and bonnets, to hold this affair,

were made like an upright bag stiffened out. In 1794 a fashion came in of finishing up the head-dress with feathers half a yard high. About 1795 these styles of expansive head-dress disappeared, and small bonnets came into use all at once, like a helmet or a straw cap, with a vizor, very much like those now worn.

From 1805 to 1810, bare arms were much in fashion with women, and a singular mode of wearing gloves prevailed. The glove was worn with a long armlet attached, which was drawn on smoothly up to the elbow, and then pushed down again so as to lie in irregular wrinkles on the arm, which was reckoned remarkably pretty. These were termed "rucked gloves." About 1808 was introduced the "gunboat" style of bonnet, which consisted of a moderate-sized crown, and a wide expanse of brim, spreading out around the face, in a form fancied to resemble the peculiar shape of a gunboat, which is very wide toward the bows.

About 1810 appeared the plaid cloaks, used both by men and women, which may still sometimes be found hung up in an old closet; very wide and long, and for women having a great clumsy hood hanging at the back of the neck. In 1814 the bonnets all at once spread out into an immense crown, leaving very little brim.

Men's costume varied during this time no less. The reign of powder and pig-tails may be said to have ended about 1793, immediately after the French Revolution; and about the same time the round hat took the place of the three-cornered cocked hat. A little later, perhaps about 1800, people began to leave off wearing wigs when they had hair of their own. It is hard to comprehend how people could submit so long to a custom so disfiguring, inconvenient, and cumbersome—for every wig-wearer had to have his whole head shaved every few days, and lived in constant peril of making a fantastic appearance if his clumsy and unsafe head-gear should be knocked off. Yet the mode prevailed for two hundred years; nearly from 1600 to 1800.

One of the early costumes which replaced the ante-revolutionary fashions for men, and which was the height of the *ton* in 1786, consisted of a very broad-brimmed hat; a powdered wig with a pig-tail; a coat with a very short waist, broad lapels, and tremendous swallow-tails; buckskin breeches, and top-boots.

During this period, and, indeed, down to about 1830, gentlemen's necks were often swathed with an enormous thickness of cravat; a fashion said to have been introduced by George IV., while a leader of fashion, to hide the scrofulous swelling of his neck. Two or three handkerchiefs, each a full yard square, were thus worn; giving the neck an appearance which now seems excessively dowdy and uncomfortable.

During the closing years of the last century, knee-breeches began to yield to the pantaloons, which came from France; and shoe-buckles disappeared to give place to a mere string or ribbon. The prince-regent of England, afterward George IV., first led this fashion, although he resumed buckles at the petition of the buckle-makers, who represented that the ruin of their trade would starve them. It was ruined, however, in spite of them and him, and notwithstanding that he was the inventor of a shoe-buckle.

This introduction of the pantaloons and the shoe-string, and the disuse of wigs, marks the era of the modern costume. The dress-coat, however, or a garment much like it, was worn at intervals, as early as 1750; although it did not definitely occupy the place of the old-fashioned broad skirts until about 1800. It should be observed that "pantaloons" means, in its first strict sense, a garment fitting quite tightly to the shape of the leg, and buttoning close around the ankles, as if a prolongation of the knee-breeches. The present pantaloons are in strictness "trousers," having been introduced as such, and by that name, under the auspices of the Duke of Wellington, after the battle of Waterloo.

High-heeled shoes, for women, went out of use about 1789, and were replaced by something very like the present graceful, low-quartered shoe. Round toes, for men's shoes and boots, came in about the same time, and prevailed until about 1804 or 1806, when the first beginnings appeared of square toes.

Period third, 1815 to 1830. The last period may be characterized as that of tight, scant dresses. The present one may be described as that of big bonnets, puffed hair, and leg-of-mutton sleeves, which last, however, appeared only toward its end.

Knee breeches, which had continued to be "full dress," were now quite out of date. Frock-coats had been introduced by the Duke of Wellington and his officers after the

peninsular war, together with the boot called after him. In 1815 trousers began to be worn, being also introduced under his auspices; although the original pantaloons, with its tight, close fit and ankle-buttons, maintained itself for ten years or more before quite disappearing. In 1815, also, bonnets underwent a great revolution, shrinking to small dimensions in the crown, and spreading into a portentous brim.

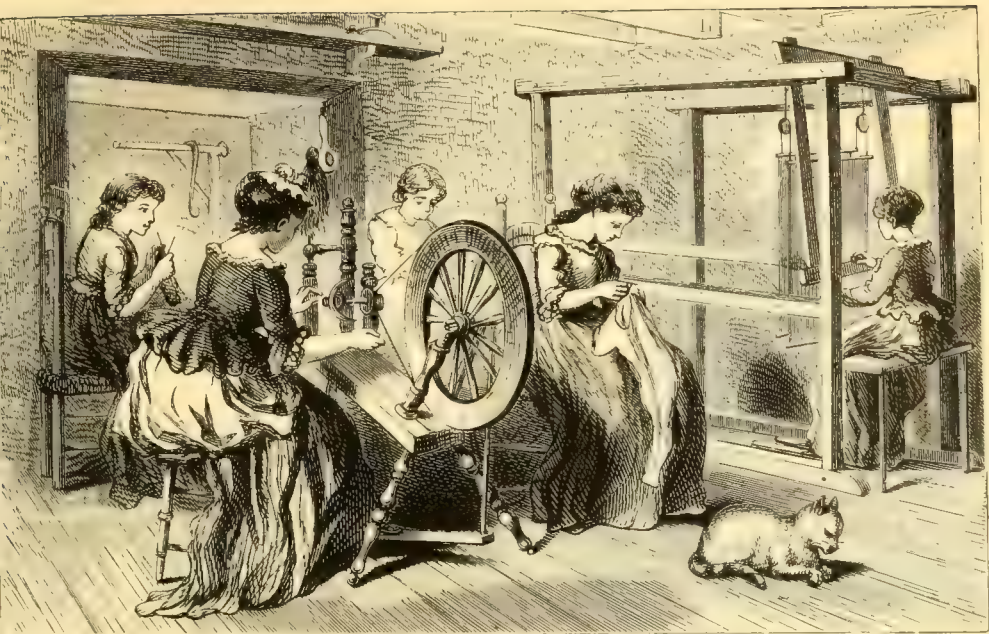
Not far from 1820 began what may be called the modern era of tight lacing, which was adopted as the short waists began to be replaced by longer ones, and the recent type of female dress, viz., a long waist, bulging with a sudden angle into a voluminous skirt, became established. About 1825 was adopted a method of wearing the hair in great puffs at the sides and on the top of the head, dressed, also, with large bows of ribbon. To hold this array, an enormous bonnet was required, and was used. Skirts now began to be a very little fuller; two or three plaits at the waist being all that were at first admitted, and more being introduced from time to time. About 1828 began the "leg-of-mutton sleeves," which grew at once to enormous proportions. These ridiculous and most inconvenient appendages were stuffed out with down, or held out with reed, millinet, or whalebone; but they were continually becoming crushed, and were very troublesome. They had a certain absurd harmony with the big bonnets and puffed hair of the day, as well as with the broad-shouldered, stiffly-cut capes that were worn with them.

Period fourth, 1830 to 1845. The beginning of this period is marked by the introduction of the costume of the days of Jackson—the bell-crowned hat, long, swallow-tailed coat, with high collar and "bishop" sleeves, and loose trowsers. The bishop sleeves were distinguished by rising into a ridge where they were set in at the shoulder, as do the sleeves of the episcopal vestments; this ridge being in 1830-35, stuffed with cotton to hold them up. The big bonnets and puffed hair, wide capes and leg-of-muttons still prevailed. Boots and shoes were worn with very broad, square toes until about 1840, when narrow toes took their place; and the calash, invented almost a hundred years before, was still employed to cover the elaborate head-dress. The decrease in the size of women's sleeves is the chief feature of this period; the minor

details of the successive changes of style were innumerable, as usual.

Period fifth, 1845 to 1872. This period, also, may be dismissed with brief consideration. Its first years were marked by the introduction of the sack coat, or, as it is called in France, the *paletot*. This easy, commodious, and cheap garment is infinitely more becoming than a dress-coat, and very much more convenient than either that or a frock coat. Though introduced in the present century later than either the dress or frock coat, the *paletot* may be traced to a far greater antiquity; a very similar garment having been worn at the courts of France and England about the year 1450. At about the same time was introduced that most preposterous of all feminine fashions, the *bustle*, which was a sort of pad tied on behind to make the skirts stand out with the desirable degree of fulness. This was made of various materials: cloth stuffed with bran, hair, cotton, rags, old newspapers, etc., and sometimes of India-rubber, inflated with air. The bustle marked the beginning of the recent fashion of expanded skirts. As this machine did not sufficiently spread out these garments, various other means were resorted to; the use of an enormous number of skirts—a habit most pernicious to health—and skirts fewer in number, of stiffly-starched cloth with cords sewn on, or of grass cloth, or hair cloth, or stiffened out with many cords of new manilla rope or common clothes-line, or with whalebone or coils of brass wire. All these having been tried and failed, the next invention came up, of "skeleton-skirts," made of strips of iron somewhat similar to a watch-spring. These were pronounced quite adequate to their purpose; although what the real reason of that purpose was, it would be impossible to say. Why women's skirts should constitute a great stiff, hollow cone about their lower limbs, within which they must wear an entire second suit of clothes for warmth and protection, was an unanswerable riddle. After an absolute reign of sixteen years, the "hoop skirt" fell into disgrace, and scantier, gored skirts, with panner, and bouffant over-skirts have taken its place.

Another fashion introduced during this period was that of wearing soft felt hats, instead of the round hats, which last are so often described as "hard-shells," or "stove-pipe" hats; nick-names well applied, but which did not succeed in driving out this un-



WHAT OUR GRANDMOTHERS LEARNED WHILE YOUNG.



WHAT OUR SISTERS AND DAUGHTERS NOW LEARN.

comfortable and unreasonable fashion. The felt hat was not often seen among us until the enthusiasm which attended Kossuth's visit to the United States in 1851 and 1852; after which it was brought out, at first with a feather, in close imitation of the national hat of the Hungarian hero, and called a "Kossuth hat." The feather was soon left off, but the soft hat being found both comfortable and graceful, was retained.

The most remarkable of the many changes of the last twenty five years in the style of woman's dress, and certainly one of the most unwise, has been in the mode of dressing the hair. In 1845, and for perhaps ten years later the natural hair was worn almost exclusively, with some artificial puffings, and ringlets, perhaps, but generally without other foreign additions; but toward 1860, there came in first the fashion of the "waterfall," a considerable mass of padding, over which the natural back hair was spread, the ends passed up underneath, and the whole confined in a depending and not wholly ungraceful net. But this soon gave place to coils and large masses or wads of false, or artificial hair, attached to the posterior portion of the crown, frequently almost as large as the head itself, forming a hideous protuberance on the back of the head, and giving the lady the appearance of being two-headed. This shocking style has been modified so as to be a degree less ungraceful; but with all its accessories of curls, love-locks, and pendants, the *chignon* is not only a violation of all the laws of beauty and good taste, but exceedingly injurious to health, having increased more than ten-fold diseases of the brain, spine, and scalp. This fashion of wearing the hair necessitated a material change in the bonnet, reducing its size, (till it became almost infinitesimal at one time) abolishing the cape and perching it on the top of the head, and on the forehead, instead of on the back of the head, as before. Within the past twelve or fifteen years, the round hat in some form (and there has been an almost infinite variety), has largely superseded the bonnet, not only with young ladies, but with those of middle age.

In reviewing the whole series of fashions as thus briefly presented, it will appear that, on the whole, there has been a decided improvement. There are, doubtless, a sufficient number of not very wise fashions in dress now prevailing; but the preposterous, filthy head dress of 1783, the indecent,

scanty costume of 1800, the pudding-like cravat of the same period, the broad shadow of the gunboat bonnet, the balloon-like appendage of the leg-of mutton sleeve, have each, in turn, been superseded by something, on the whole, less foolish; and it may be claimed with safety, that at this present writing, the fashions, both for men and women, are in general based upon more like common-sense principles, and admit more freedom in adaptation, and, therefore, greater convenience and grace, than has ever before been the case. It is matter of congratulation, however, that an American taste is being developed, and our ladies becoming less dependent on fashions from abroad; and every year is yielding a larger liberty to our female population, in adopting such forms and colors as suit the peculiarities of each individual, and this is still more the case with men.

CHAPTER V.

SOCIAL AND MENTAL CULTURE—INTERCOURSE—HEALTH—ART, ETC.

NEARLY all the increase in comfort and happiness which is the pride of modern civilization is traceable to scientific discovery and to mechanical invention. These causes have supplied the means of the labor-saving machines and processes of the last three-quarters of a century. The use of these machines and processes has brought it to pass that men can earn their living by the labor of a less proportion of their time than formerly. And this power enables them to devote a correspondingly larger share of effort to the task of gaining knowledge, and of pressing forward in the path of moral and mental improvement. The amount of mental activity which has been devoted to these material processes is astonishing. The inventive genius of the American people, is without parallel in the world. More than one hundred thousand patents have been issued during the present century, and every year now adds thirteen thousand or fourteen thousand to the number.

The readiest way to sketch the general progress of society at present sought to be described, will be to set forth briefly, in chronological succession, the periods or occurrences which have marked the commencement or maturity of any important influence upon the prosperity of the com-

munity, without attempting to classify them particularly.

In 1796 was taken out the first American patent for a pianoforte, by J. S. McLean, of New Jersey. The manufacture of these instruments has become very extensive; the larger manufactories sometimes turning out thousands a year. So great and important have been the improvements, both in these and in reed instruments (cabinet organs and the like), that in both, we have the highest reputation in the world.

In 1799 Dr. Waterhouse, of Harvard University, first introduced Jenner's discovery of vaccine inoculation; a measure which has substantially freed our community from the fear, the pain, and the disfigurement of the small-pox. This single discovery has had no inconsiderable influence in lengthening life, and increasing its happiness by dispelling the apprehensions, always felt before, of suffering and death.

The importance of regular, rapid, and cheap modes of travel and transportation, to the general improvement of society in wealth and intelligence, is exceedingly great. Distance of residence, difficulty of travelling, difficulty of carrying, has, through all the history of the world, been a chief means of keeping nations poor, because thus they could not exchange what they had for what they had not; and thus, however much they possessed of one thing, they were poor. For wealth does not consist in mass of possessions. Not mountains, even of gold, if unexchangeable, are wealth. Wealth is *mass and variety* of possessions together, and must therefore be produced by exchange, that is, travel and transportation. The sea-coast nations, commanding water-carriage, have in the past, been the rich ones; but the introduction of steam railways, dating from about 1830, has made our inland States rich. There were in 1872, over sixty thousand miles of railways in operation in the United States.

This also tends to promote exchange of mental wealth, by correspondence, visiting, etc.; maintains a sense of nationality, and keeps up acquaintance and good feeling. Were it not for ease of travel, there would but slight hopes of keeping Maine and Georgia in the same republic with California and Oregon. As it is they will remain.

In 1811, commenced a movement of a very different character from that of the inventor Fulton, but which has exerted an

influence upon the health and morals of our nation, even more important than the benefits of cheap and rapid locomotion. This was the temperance reform.

The laxity of manners and morals which must attend war, had greatly increased the use of intoxicating liquor during the Revolution, and it continued to spread after the peace. Dr. Rush had published his "Inquiry into the Effects of Ardent Spirits," in 1804; but no decided movement against their use was made until 1811, when the Presbyterian General Assembly appointed a committee on the subject. That and other ecclesiastical bodies, at various times, passed different resolutions and recommendations intended to limit the use of liquor, but with no very great success. The first total abstinence society was formed in Boston in 1826, and during the following ten years, others multiplied with great rapidity, liquor-selling became disreputable, and the common use of ardent spirits was to a very great extent broken up. Like most great reforms, however, the temperance movement has had its seasons of advance and retrogression, and while taking the half century together since its inauguration, it has made wonderful progress it has been rather by repeated leaps forward, than by a steady march. In 1839, the Washingtonian movement, originating among intemperate men, was a great advance; the attempts at legislation on the subject from 1842 to the present time, have done some good, and probably some evil; the absolute necessity for an enlightened public opinion to enforce them, not being always understood. The great prevalence of beer drinking, and the appetite for intoxicating liquors, stimulated by the late war, have been serious obstacles to its success. The organization of Temperance orders, and the Father Matthew and other class movements have done much to make liquor selling obnoxious, and tipping disreputable.

In 1832 the study of phrenology was introduced into this country by Spurzheim. This system, whatever the correctness of its doctrines as to indications by the shape and size of the head, which are certainly believed by many intelligent persons, is at any rate entitled to the merit of having furnished a new and very clear classification of the mental faculties, which has become the means of a great improvement in mental philosophy.

Two years later, viz., in 1834, the homœo-



THE FAMILIAR PARLOR

pathic system of medicine was introduced, which has since become very extensively believed. As in regard to phrenology, it may be said of this system, that whether all its peculiar doctrines are true or false, it has at least done good indirectly, by operating to reduce the quantity of medicines given by the old-fashioned practitioners, and to direct their attention more than before to the very important points of regimen, ventilation, and the other collateral departments of general hygiene.

About 1840 was introduced into this country the greatest improvement in pictorial art since the discovery of painting in oils by John Van Eyck in the fifteenth century; the greatest discovery ever made in that department of human knowledge; viz., the art of taking pictures by the chemical action of light, named, from its discoverer, daguerreotyping; and various modifications of which are known as the talbotype, ambrotype, crystalotype, photograph, etc. These methods render it both easy and cheap to procure an absolutely and necessarily perfect representation of a person or a thing. Besides the pleasure of thus being enabled, at a trifling cost, to possess a whole gallery of perfect portraits of friends, this art has already been made useful in securing diagrams of lunar and other astronomical phenomena, and in taking pictures of buildings, land-scapes, etc.; it has been applied to purposes of scientific and medical discovery; and is now the basis of several processes of printing, and is largely used in the illustration of books, etc., etc.

Not far from the same time, other systems of medical treatment were introduced—the “water-cure,” or “hydropathic” system, which has proved very useful in certain classes of diseases; the “Swedish movement” cure; the use of electricity and magnetism, and later the “Lifting cure,” and “The Oxygen treatment.” The first named, besides a very simple mode of life, consists only in the application of water, at various temperatures and in various ways; and it is successfully practised in many establishments devoted to it. All these new systems, though incomplete as modes of treatment for all classes of diseases, have exerted a modifying influence upon the regular practice.

In 1845 the principle of cheap postage was established in this country by a law of

Congress, and another step thus taken toward the entire release from tax or encumbrance of the intercourse of one mind with another. Cheap postage is one of the latest signs of a high civilization; it is one of the most promising indications of our own future.

Still one year later was discovered the medical process, since termed “anæsthesia,” which consists in rendering persons insensible by the inhalation of certain gases (nitrous oxide, ether, or chloroform), thus affording an opportunity of performing surgical operations quite without the knowledge of the patient. The agonies suffered in the dentist’s chair, or under the hands of the surgeon, and the not less tormenting pain of many nervous diseases, have thus been much alleviated, and even entirely relieved.

In the same year was issued the first patent for sewing machines, to Elias Howe, jr. It is only necessary to allude to the very great saving of time, and strength, and health which these machines have effected; their effects are before the eyes of all. They are performing in a day the work of weeks, and doing very much to relieve women of a species of labor which was principally confined to them, but which consumed, in the merest petty drudgery, a wretchedly great proportion of their time, and often ruined health and destroyed life.

An important outgrowth of one of the departments of improvement which have been described, is the modern hotel. The American first-class hotel is an institution quite peculiar to this country, and includes within itself many of the various inventions which have just been catalogued: splendid furniture, elaborate food, economical and yet liberal housekeeping, labor-saving machinery; in short, an unrivalled combination of the applications of human ingenuity to the improvement of domestic life.

To recapitulate: It has thus been shown, though briefly and with many imperfections, that the course of our nation during the ninety-seven years since the Revolution, has been one of steadfast, essential, and constant improvement in things material and immaterial, physical and mental, practical and ornamental; in business, travel, dress, homes and home comforts, wealth, morals, intellect—in short, in every department of human activity.

BOOKS.

CHAPTER I.

BOOK TRADE—PUBLISHING—JOBGING—RETAILING.

"YANKEE curiosity" is frequently a subject of remark with the flippant writers and travellers of the old world, and if not always urged as a reproach, it is not seldom referred to in a deprecating sense by those who do not appreciate the immense activity of intellect of which it is one manifestation. There is no doubt either of the existence of the alleged curiosity, or that it sometimes exhibits itself in a ludicrous light; but it also manifests itself in the indefatigable investigations to which nature and art are continually subjected by the ever inquiring American mind. There result from those investigations, not the dreary metaphysical theories that are evolved from German contemplation, but those countless inventions, improvements, and applications of mechanical principles that are every year recorded in the patent office, and the effects of which are seen in every department of industry. The religious and political assemblies; the amusing, instructive, and scientific addresses of the lecture-room; and the marvellous circulation of the public press, all reflect that thirst for knowledge which is a part of Yankee curiosity. This, however, gives a still stronger evidence of its vigor in the book trade, which, in the United States, shows an extent of sales that no other country can hope to approach. It is based on the universal ability of the people to read, and on that "curiosity," or thirst for knowledge, which induces them to do so, accompanied by means to purchase books. The word "means" comprehends not only greater wealth on the part of the purchaser, but reduced prices for the books. The existence of 30,000,000 of people who can all read, supposes an immense market for books, that must be supplied; and happily busy intellects have written, while the mechanical processes of publishing have been developed in a manner

to supply the demand. In order to compare the book market of the United States with that of Europe, we may refer to the census returns of 1870. That informs us that in that year there were 33,586,989 white persons in the country. Of these, 16,000,000 were over 20 years of age, and of these, 1,035,000 could neither read nor write, of whom 425,000 were aliens. We now turn to France, and we find that there were 19,000,000 persons over 20 years of age; and of these, 5,700,000 only could read and write, and the remainder, 13,300,000, could not. In other words, there were, in the United States, 14,650,000 readers of books, against 5,700,000 in France. But there were, also, in the United States, 6,977,993 persons between 10 and 20. Of these, nearly 6,000,000 were in school, and, as a consequence, bought and read school-books. The ratio of these scholars to the whole number who can read and write must be the same in France. Hence there are, in fact, three times as many readers in the United States as in France.

The making of books has kept pace with the increasing demand for them. If we look back to the library of King Alfred, we find that he gave 8 hydes of land for a book on cosmography, brought from Italy by Bishop Biscop. At such rates, none but a king could afford to buy a book; but, on the other hand, there were few, even among nobles, who could read if they had them! There was no market, and no manufacture. As the art of reading became so far progressive that the old barons could sign their names, instead of punching the seals of instruments with their sword pummels, some little demand for books sprung up, but at enormous rates. The state of the book market, when literature began to dawn in those iron ages, Scott makes old Douglas describe in terse phrase:—

"Thanks be to God! no son of mine,
Save Gawain, e'er could pen a line."

A modern canvasser would not have gotten

his name in advance for numbers to be left. Louis XI., of France, in 1471, was obliged to give security and a responsible endorser to the Paris faculty of medicine, in order to obtain the loan of the works of an Arabian physician. The art of printing, which was introduced into England in 1474, had an important influence upon the production of books, and this, probably, was the cause of a greater spread of learning, that reacted upon the demand. The Bible was the most commonly used, and these, in noble houses, with heavy covers and clasps, were chained to shelves and reading-desks. In the sixteenth and seventeenth centuries, books were mostly folio and quarto. But the dimensions of books decreased as they became popularized, and this was in proportion to the spread of learning among the people. This went on gradually, until both the market and supply were considerable, up to the eighteenth century. With the colonies of America—among whom both religious and political views were based upon general education—schools became an institution, and in New England the use of them an obligation. From that time the market for books increased with the numbers of the people. The first bookseller mentioned is Hezekiah Usher, of Boston, in 1652; and his son, John Usher, is mentioned by a writer in 1686, as very rich, and as having “got his estate by bookselling.” That books, in the early part of the century, were by no means abundant, or easy to be got at, is evident from what Franklin tells us of the difficulties he encountered, and the great advantage he enjoyed, in having access to the library of a merchant. The most of them were imported at, no doubt, such expense as confined their general use to the better classes. Some years after, viz., in 1732, at the time Franklin commenced the publication of “Poor Richard’s Almanac,” in Philadelphia, a Boston bookseller advertised as follows:—

“Whereas it has been the common method of the most curious merchants of Boston to procure their books from London, this is to acquaint those gentlemen that I, the said Fry, will sell all sorts of account books, done after the most acute manner, for 20 per cent. cheaper than they can have them from London.

“For the pleasing entertainment of the polite parts of mankind, I have printed the most beautiful poems of Mr. Stephen Duck, the famous Wiltshire poet. It is a full

demonstration to me that the people of New England have a fine taste for good sense and polite learning, having already sold 1,200 of those poems.”

This was pretty well for Richard Fry, and we hope he had not then introduced the art of magnifying his sales on paper. That there were a number of booksellers then doing well, is evident from the fact that Mr. John Usher had made his fortune at it 50 years before; and in 1724 there was held a convention of Boston booksellers, to regulate the trade, and raise the price of some descriptions of books. The publication and sale of books increased slowly, until the events of the war began to excite the minds of the public, and works on those subjects were eagerly taken up. The practice was, to some extent, to sell books in sheets, to be bound as the purchaser might fancy—perhaps to be uniform with his library. This is now done only where the work is sold in numbers by subscription. There was then less capital in the trade, and few were disposed to risk the amount required to get out large works of a standard character. The cost was then more than it now is, and the time required much longer to complete and dispose of it. There was then formed, in 1801, the American company of booksellers, and these generally subscribed together in the publication of a work, to guarantee the outlay. There was a sort of union, that regulated the principles of publication, and those who did not conform to these regulations were repudiated. School-books were, as a matter of course, as having the largest and steadiest market, the first that were extensively published. A type of this class of books is Webster’s Spelling-Book, which has grown with the country in a remarkable manner. In 1783, with the advent of the peace, Mr. Noah Webster published his American spelling-book. The work became a manual for all schools, and its influence has been immense, in giving uniformity to the language throughout the whole country. The “Yankee schoolmaster,” who was raised upon that book, has gone forth into every section of the Union, spreading the fruits of that seed of knowledge, as writes Fitz-Greene Halleck:—

“Wandering through the southern countries, teaching
The A, B, C, from Webster’s spelling-book.”

When it was first published, there were 3,000,000 people in the United States; there

are now 39,000,000, and there have been sold 54,000,000 copies of the work, or five for every four souls in the Union. The spelling-book was enlarged into a dictionary in 1806, and immediately Dr. Webster went on with preparations for a still larger work. This occupied him 20 years of unremitting research, during which the sales of his spelling-book supported his family; in 1828 the dictionary appeared in two quarto volumes. Twelve years after, viz., in 1840, a new edition made its appearance, greatly improved; and since Dr. Webster's death, there have been two complete revisions of his great dictionary, now known as Webster's Unabridged, viz., in 1847 and 1864, beside several partial revisions. Of this Unabridged Dictionary, now a ponderous quarto of 1,840 pages, about 350,000 copies have been sold, and a vastly greater number of the smaller dictionaries, of which there are seven of different sizes. The sales of the spelling-book are now about 1,500,000 copies annually. These works have exerted a powerful influence in giving uniformity and precision to the use of the language in all parts of the country, and as a result, there are fewer dialects here than in England.

The publication of religious works was greatly promoted by the societies formed, particularly the American Bible Society, which was formed in 1816; the Bible Society of Philadelphia in 1808; one in Connecticut in 1809; and also one in Massachusetts. The American Society in New York published, in its first year, 6,410 volumes, mostly Bibles and Testaments. In 1871, the issues were 1,196,797, and the whole number during 56 years, was 28,601,489 volumes of the Bible. A good copy of the Bible is sold for 60 cents, and a cheaper edition at 35 cents; Testaments as low as 10 cents. Contrast this with the Bible copied in 22 years by Alcuin for Charlemagne about 800, and which was sold in modern times to the British Museum for \$3,750, and the progress we have made appears great.

The American Bible Union was organized in 1850, and it has since issued 259,748,804 pages of matter, including Bibles. The publications by other societies have been considerable.

These societies were not a portion of the regular book trade, which continued to be mostly under the association, until the appearance of the Waverly Novels in 1820 to

1830. The competition to which the large demand for these works gave rise, broke down old arrangements of the trade. The publishers thenceforth acted independently. At the same time, the supply of desirable books from abroad, upon which there was no charge for copyright, was much increased; and as all the publishers were upon the same footing in respect to those books, the competition extended only to the mechanical process, reducing its cost to the lowest rates. The capitals of the publishing houses gradually increased, but there was still great difficulty in getting an American book printed. Cooper tells us, in the preface to his *Pilot*, that so great was the difficulty he encountered in getting a printer to undertake it, that he was obliged to write the last page of the story first, and have it set up and paged, to insure the extent to which the matter would run.

The publication of books is a business which has undergone many changes within the past hundred years. There has at all times been a limited amount of publishing of works by American authors, partly because it was so much more profitable to reprint foreign works on which there was no copyright, and which had already some reputation; and partly because in the early struggle for national existence among a new and not homogeneous people there was not the opportunity for that profound culture and leisurely study which could alone make American works popular and successful to the publisher. There were, of course, exceptions to this general rule; but for a long period, publishers were shy of undertaking a work whose author had not already attained a reputation abroad. The great bulk of publishing was therefore limited to the reprinting of foreign works, sometimes with introductions, appendices or notes added here, but the reputation of the foreign author was the inducement to the publication. Matters have changed in this respect, and American copyright works now largely predominate among the publishers' issues. The reprints in 1871 were nominally less than one-fifth, though really probably about one-fourth of the whole number of books published that year.

For the first fifty or sixty years of our national existence very few important original works were published except by "subscription;" the author or publisher issuing

a prospectus describing the work and by solicitation in person or by letter, obtaining a sufficient number of subscribers to warrant its publication. Usually a subscription of from 1,200 to 2,000 was deemed sufficient to guaranty the success of the work, and if a larger number were printed they were disposed of at auction or to chance purchasers. There was, during the period of which we are speaking, no stereotyping; that process was then unknown, and all copies were printed direct from the types, while in books which required to be often reprinted, such as Bibles, Prayer and Psalm books, &c., the type was kept standing, involving a very heavy expense for the publisher. Under these circumstances there was little encouragement for the publisher to take any doubtful risks, and it is not surprising that so late as 1820 the whole number of books manufactured and published in a single year throughout the whole country should not have exceeded the value of \$2,500,000, of which school books formed nearly one-third. Stereotyping, electrotyping, and wood engraving have effected great changes in these particulars, in the publishing trade. More than \$40,000,000 worth of books are now issued in a single year. The large publishing houses employ a "reader" and sometimes more than one, whose business it is to decide upon the merits of manuscripts offered for publication, as well as to examine any foreign works which it may be thought desirable to reprint. These "readers" of course reject four or five manuscripts, and sometimes more, for every one they recommend; sometimes deciding unwisely, as when five or six of the ablest of them declined the manuscript of "Uncle Tom's Cabin," in the belief that it would not sell; but generally with a judicious regard to the interests of their employers.

If the book is accepted, the terms on which it shall be published are next to be considered. The publishing house may require the author to share the risk with them, by furnishing the cost of stereotyping, or possibly of manufacturing a first edition, to be reimbursed in whole or in part by a percentage on the sales;—a plan which though safe for the publisher, hardly leaves much margin of profit for the author;—they may require the author to make over to them all copyright till the cost of stereotyping is made up, and thereafter, allow them five, seven and one-half or ten per cent. on the

wholesale or retail price of the book, as they can agree; or if they are confident of the success of the work they may pay ten per cent., or in the case of a popular author even more on the selling price of all copies sold. There is the greatest possible diversity in these copyright contracts. In some instances the publisher pays a fixed sum, and then holds the copyright, taking his risk of reimbursement from the sales. This is generally the method pursued by the subscription-book publishers, of whom we shall say more by and by. If they pay copyright at all, they usually pay not more than from three to five per cent. on the retail price, though from the greater extent of their sales, this pays the author much better than the large percentage of the "regular trade." Sometimes, again, a publisher has a work prepared, employing several writers and paying them so much a page for their labor.

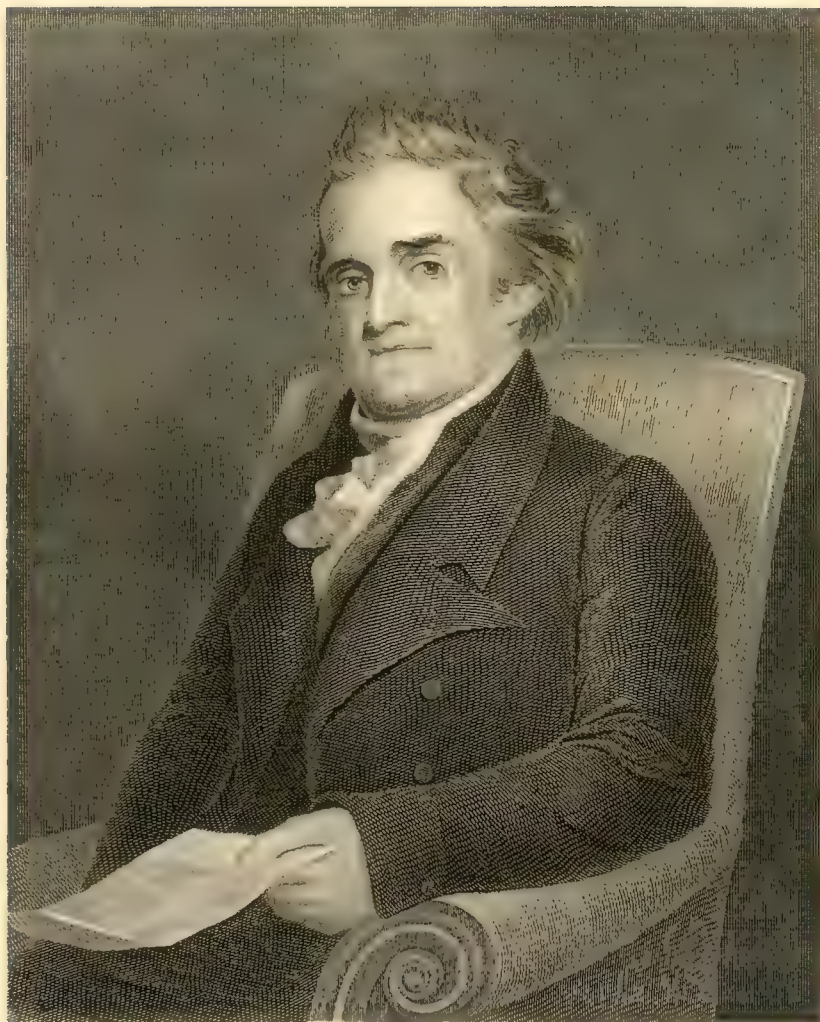
Whichever of these plans may be adopted, the manuscript is handed over to the printer to be set up. The "composition," or setting up the types, is conducted with more or less expedition according to the character of the matter. When set up, proofs are taken—usually called "galley proofs," because they are impressions from the matter which is set up the width of the page or column, and of indefinite length, technically called "galleys." The proofs are carefully read by a professional proof-reader, and usually also by the author, after a first revision, and when corrected, the matter is made up into pages with the requisite running titles and paging, and if any large sale is expected, the pages are either stereotyped or electrotyped. The plates, as these stereotypes or electrotypes are called, are next sent to the press-room, where paper of the proper size having been provided and prepared, the book is printed and goes to the binder, who, having folded, stitched, covered, stamped, and gilded it, delivers it at the publisher's warehouse, ready for market. If it is illustrated, the engravings are generally made while the work is going through the press. They considerably enhance the cost, but add also to the salableness of the work. At the time of putting the book on the market from one hundred to three hundred and fifty copies are sent to the members of the press, and two copies are sent to the Librarian of Congress, who is *ex-officio* the Register of copyrights. A considerable, often a large, sum is expended in advertising the book. Most of the

larger publishers have one or more periodicals of their own, of large circulation, in which a part of their advertising is done, but all pay heavy tribute to the great dailies and weeklies also. The leading publications have what are called "standing orders" from their correspondents all over the Union, for so many copies of every 16mo or 12mo book, or a smaller quantity of every 8vo volume which they publish, immediately on its publication. These standing orders are, in many cases, sufficient to insure them against loss in whatever they publish, and thus make all further sales largely profitable. A few years ago books were sent out on commission, to be returned if not sold, but this was attended with so much loss, that it has now been given up except in a few instances, in school books.

The school book trade, though sometimes carried on by publishers who are also in the general trade, is becoming more and more distinctive in its character every year. The method of publication and of putting the books on the market differs materially from that of miscellaneous books. They are usually published in series, of Readers, Arithmetics, Geographies, and other text-books, the authors receiving but a small percentage on each book, but their immense sales making this very profitable. They are introduced into schools, or approved and ordered by Boards of Education, or School Superintendents, on the urgent solicitation of agents, and often after a long and exciting contest, and are furnished usually at first at a very low price for introduction. The sales are enormous, constituting fully one-half the aggregate sales of books in the United States. Another distinct branch of the publishing trade is the "subscription book business." Books are not now subscribed for, to insure the publisher against loss in their manufacture, as they were fifty or sixty years ago, but the business of publishing books, to be sold only by subscription, has attained a great magnitude. A book published for sale by booksellers, is duly announced, advertised and exposed upon the counters of the booksellers, usually has its run of six months or so, sells to the extent of 2,000, 3,000, or 5,000 copies, rarely more, and sometimes not over 1,000 or 1,500, and then usually becomes an old book not often inquired for. The subscription book, on the other hand, is not intended for the book stores, and is

not usually found there. It is generally an octavo volume, largely illustrated and selling at from two and a half to five or six dollars, cheaper books not proving so successful. It is well known by those familiar with the business, that this is the only way by which large and expensively illustrated books can be made to pay. The most valuable works in this country and England are sold in this way; while the expense of selling is greater, the sales are so much larger, that not more than a tenth part as much for original outlay has to be added to the price—the publisher selling so many more, receives a much less percentage. This explains why books can be, and are delivered at the homes of the purchasers, all over the country, cheaper than over the counters of book stores. The net profit per volume to subscription publishers is very small. On most books a sale of 10,000 copies would not pay for the trouble and expense,—the cost of engraving being enormous—one of 50,000 even is but moderate, while sales of a hundred thousand or more, which are not uncommon, pay very handsomely. We might give many instances of enormous sales of these books. Goodrich's *Universal Traveller*, one of the earliest of this class, sold largely. The *Cottage Bible* in two volumes, over 200,000 sets. Of the histories of the late war, four considerably exceeded one hundred thousand copies each—one reaching 175,000—Kitto's *History of the Bible*, 200,000; Richardson's *"Field, Dungeon and Escape,"* 80,000, and his *"Beyond the Mississippi,"* 100,000; Stephens' *"War Between the States,"* 62,000; *"Life and Death in Rebel Prisons,"* 95,000; *"Smith's Bible Dictionary,"* 1 vol., Royal 8vo, 150,000; Matthew Hale Smith's *"Sunshine and Shadow,"* 100,000; Raymond's *Life of Lincoln*, 70,000; Rev. Dr. March's *"Night Scenes of the Bible,"* over 100,000; one edition of Fleetwood's *"Life of Christ,"* (there are five or six in the market) 150,000; *"Bunyan's Pilgrim's Progress,"* one edition, 110,000; Mark Twain's *"Innocents Abroad,"* 100,000; *"Roughing It,"* 100,000.

Subscription book publishers have been accused of foisting worthless books upon the market, but a fair examination will show that, in proportion to the number of different books published, the percentage of worthless ones is far less than of those published by the regular trade; and very many



— Webster

of their books are really of the highest character.

The practice of selling subscription books by numbers, once greatly in vogue, is now confined to a few houses, mostly English. Some of these have been very successful, but the greater part have abandoned it in consequence of the dissatisfaction which it occasioned. The numbers will sometimes far exceed what was announced, to complete the work; they are delivered at uncertain times, and when completed the cost is usually much greater than the subscriber had expected. If they are all preserved they have still to be bound at a heavy expense. It not unfrequently happens that the subscribers drop off so fast from disappointment and dissatisfaction that the publisher is compelled to abandon the work unfinished.

There are other subdivisions of the book-trade, such as publishers of Medical books, Law books, Military and Scientific books, Masonic books, and Religious books, which are again divided into Sunday School books, and Theological works.

About 1830, a system of semi-annual trade sales was inaugurated, for the purpose of diffusing more widely the publications of the publishing houses and bringing buyers and sellers into more frequent contact. These sales, though greatly modified from their first plan, are still maintained, but with the abundant facilities for transportation and transmitting orders, have mostly outlived their usefulness, and many of the leading publishers do not now contribute to them. The number of publishers in the United States is nearly four hundred, but of those extensively engaged in the business the number is less than one hundred.

The sale of old or second-hand books is also a very extensive branch of business in the great cities. It is obvious, that where book-buying and book-reading are so prevalent, as is the case among almost all classes of the people in the United States, there must exist a large number both of public and private libraries, and that these, through death, and the continual vicissitudes that attend families, are being constantly broken up. If every family has a library of greater or less magnitude, sooner or later there is a sale, and it generally comes to the hammer in one or more of the large book auctions that are held almost nightly. These auctions are attended by the public, but mostly by

the second-hand booksellers. Of these there are numbers in those parts of the city frequented most by strangers. They are the same as the "book-stalls," so familiar a feature in the literature of England and the countries of western Europe, as they are in fact a necessity everywhere. In New York, the stall-keeper generally procures, for a rent of \$50 to \$150 per annum, according to circumstances, the privilege of putting up a set of shelves against the outside of some store corner. These shelves shut up at night, like a large window, and the shutters are fastened by iron bars that have padlocks. These shelves contain a small stock, from \$300 to \$400 value, of the most saleable books that can be picked up cheap at the auctions of books, or of household furniture of families breaking up, or purchased of needy persons who offer them. It follows that the stalls, or stands, become the receptacles of all old books, and sometimes very rare and valuable ones that have gone out of print, and can be found nowhere else. A great many valuable foreign books are found here, having been disposed of by immigrants who become necessitous. A large number of books are sold from these stalls, which also keep much of the current new literature. The keepers—some of them—soon become possessed of sufficient capital to open whole stores; and there are now in New York, and most cities some very large stores that have rare collections of old books. This business has also extended across the water, so that persons of more scholarly tastes have, through these agencies, access to the reservoirs of old books to be found in the cities of Europe.

In the period from 1848 to 1857, works of fiction, both from known and unknown authors, had an immense sale. Mrs. H. B. Stowe led the way in this matter, her "Uncle Tom's Cabin" selling to the extent of 310,000 copies here, and nearly a million and a half copies in England; of "The Lamp-lighter," by Miss Cummings, 90,000 copies were sold; of "Fern Leaves," 70,000; "Alone," by "Marion Harland," over 50,000; "Fashion and Famine," by Mrs. Ann S. Stephens, 30,000; "Wide, Wide World," and "Queechy," by Miss Warner, nearly 100,000 each, etc., etc.

The circulation attained at times by sterling and standard works is very large, as follows:—

Irving's Works,.....	1,100,000 copies.
Irving's Sketch Book,.....	98,000 "
Longfellow's Hiawatha,.....	43,000 "
Hugh Miller's Works,.....	50,000 "
Grace Aguilar's Works,.....	157,000 "
New Am. Cyclopædia, Dana & Ripley, 16 vols.,	45,000 sets.
Benton's Thirty Years' View, 2 vols., 8vo.,	98,500 copies.
Kane's Arctic Voyages, 2 vols., 8vo.,.....	65,000 "
Harper's Pictorial Bible, \$20.,.....	25,000 "
Goodrich's History of all Nations, \$7.,.....	30,000 "
Dana's Household Book of Poetry,.....	75,000 "

Kane's Voyages paid \$65,000 copyright. The sale of Prescott's Histories was very large, giving, it is said, 50 cts. copyright. The sales of school books surpasses in quantity those of all other books.

We have referred to the very large sales of Webster's Spelling-Books and Dictionaries. The aggregate of these to the close of 1871 exceeds sixty millions of volumes. For several years before Messrs. Coledge & Brother relinquished the business (in 1857), their sales of Webster's Speller were very nearly one million copies per annum. Messrs. Appleton became the publishers in 1857, and though for several reasons their sales have, a portion of the time, been smaller than Coledge's, yet their aggregate sales, to the close of 1871, were 13,390,000 copies, and their present rate of issue is about 1,030,000 per annum. This house have also sold about two and a half millions of Cornell's Geographies, and more than 1,000,000 copies of Quackenbos' Series of Text books. They are also the publishers of the "New American," and the "Annual Cyclopædia" of which about 1,200,000 Super Royal 8vo volumes have been sold. They publish five or six periodicals, most of them of very large circulation, and a Miscellaneous list second in extent only to Messrs. Harper & Bros.

Messrs. E. H. Butler & Co., of Philadelphia, the present publishers of Mitchell's Geographies, sell about 350,000 copies annually, and the aggregate sale in the thirty-two years since their first publication has been about 9,500,000 copies. Smith's Grammar, also published by this house, sells at the rate of 100,000 copies a year. Over three millions of copies of it have been sold.

Messrs. Ivison, Phinney, Blakeman & Co., one of the largest houses in the school-book trade, sell annually of their Sanders' Readers and Spellers over 1,000,000 copies, and of their other text-books about 4,000,000 more. The Sanders' Spellers and Readers had been sold up to the close of 1871 to the extent of more than 26,000,000 of copies; Robinson's Mathematics, 4,000,000 of copies; Faskuelle's French, and Woodbury's Ger-

man Series, 500,000 copies; Spencerian Penmanship, 1,750,000; Swinton's History, 30,000 copies in six months.

Messrs. A. S. Barnes & Co., also largely engaged in the school-book trade, have sold in the aggregate of Davies' Mathematical works about 7,000,000 volumes, and are now selling about 350,000 of them per annum. Of Mrs. Wilard's Histories their total sale has been about 350,000; of Clark's Grammars, 800,000; of Parker & Watson's Series of Readers (completed 1859) a total of about 7,500,000, and an annual sale of about 700,000; Monteith & McNally's Geographies, total about 4,750,000; annual sales about 400,000. Steele's Fourteen Weeks Series in Sciences, annual sale of about 50,000. Of Cleveland's Compendiums and Wood's Botanies, each a total sale of about 150,000. Their Teachers Library has sold about 100,000 volumes. Their total annual sales of the "National Series" of text books are about 4,000,000 volumes.

Messrs. Sargent, Wilson & Hinkle, of Cincinnati, the publishers of McGuffey's Readers and the Eclectic Educational Series, sell annually about 3,500,000 volumes of these books.

Messrs. Sheldon & Co., publish Stoddard's Mathematical series of which over 6,000,000 copies have been sold; Colton's Geographies, over 2,000,000; Comstock's text-books in Philosophy, Chemistry, etc., 2,000,000; Bullion's Series of Grammars and Classics, whose sale has been very large, and Lossing's School Histories, also very popular.

Messrs. Harper & Brothers have combined with the largest list of Miscellaneous publications in the country a very extensive issue of school text-books, of all kinds, to which they are constantly making additions. They also publish three of the most widely-circulating periodicals in the United States. They employ an active capital of about two million dollars in stock and machinery, expending more than \$800,000 per annum for paper alone. They run over fifty power presses, thirty-five of them Adams' presses, and many of them night and day. They have published 2,600 works, in over thirty-five hundred volumes, about equally divided between original works and reprints. Their issues of bound books amount to more than three and a half millions of volumes per annum.

Messrs. Lippincott & Co., of Philadelphia,

publish a large list of books, but their most important business is the jobbing of books to booksellers throughout the country. Their business in favorable years amounts to from five to nine millions of dollars.

Messrs. Cowperthwait & Co., and Messrs. Claxton, Remsen & Haffelfinger are also leading houses in the school-book and jobbing trade.

The sale of music books is very large. Some of the smaller music books for schools and Sunday-schools have sold to the extent of more than two millions of copies, and the "Carmina Sacra," a popular collection of church music, has had a sale of over 500,000 copies. Messrs. O. Ditson & Co., of Boston, and C. H. Ditson & Co., Bigelow & Main, T. E. Perkins, F. J. Huntington & Co., Philip Phillips, A. S. Barnes & Co., Horace Waters, and W. A. Pond & Co., of New York, Root & Cady of Chicago, E. H. Butler & Co., and Lee & Walker of Philadelphia are the largest music book publishers.

The publication of agricultural books has been made a specialty by one or two houses, and one of these, Messrs. Orange Judd & Co., who are also the publishers of the agri-

cultural paper of largest circulation, sell very large quantities.

The following table gives the number of works of the different classes specified, published in each year or period mentioned:

	1855. Works.	Jan., 1856, to Mar., 1857. Works.	1855. Works.	1871. Works.
Educational,.....	139	748	67	288
Natural History, Agriculture and Science,.....	65	190	189	327
Biography,.....	124	213	150	114
Essays, Poetry, and Fiction,.....	776	1,637	445	629
Theology and Religion,.....	531	842	124	383
History,.....	76	231	161	93
Juveniles,.....	92	117	312	83
Music and Fine Arts,.....	42	174	37	115
Voyages and Travels,.....	19	177	25	117
Medicine and Law,.....	29	138	55	312
Drama,.....	29	23	..	13
Classics,.....	13	61	11	67
Mechanical Sciences,.....	23	89	42	48
Miscellaneous,.....	91	240	113	..
	2,132	4,885	1,812	3,297
Of which were Reprints,.....	619	1,492	276	622

Mr. S. G. Goodrich (Peter Parley), in his "Recollections of a Life-time," gave a table of the value of books manufactured and sold at different periods in the United States. We add to that table an estimate of the values of each class of books sold in 1870, based upon the census returns for that year:

	1820.	1830.	1840.	1850.	1856.	1870.	1870.
School Books,.....	\$75,000	1,100,000	2,900,000	5,500,000	7,500,000	10,100,000	20,300,000
Classical Text Books,.....	250,000	350,000	550,000	1,000,000	1,500,000	2,000,000	3,400,000
Theological and Religious,.....	150,000	250,000	300,000	500,000	650,000	1,000,000	4,150,000
Law,.....	200,000	300,000	400,000	700,000	800,000	900,000	1,200,000
Medical,.....	150,000	200,000	250,000	400,000	550,000	700,000	950,000
All others,.....	1,000,000	1,300,000	2,000,000	4,400,000	4,900,000	6,500,000	10,700,000
	2,500,000	3,500,000	5,500,000	12,500,000	16,000,000	21,200,000	40,700,000

A part of this great increase from 1860 to 1870 is due to the enhanced price of books since the war, but the greater part is the result of the new impulse given to education and intelligence in the nation. More than thirty millions of our people are readers and require books as regularly as they require food. It is computed that nearly two millions of the Freedmen have learned to read since 1863. The establishment of an efficient public school system in nearly

every State in the Union, the organization of a National Bureau of education, the Peabody Educational Fund, the establishment of schools of all grades for the Freedmen and their children, and the liberal endowment of so many institutions of higher education have all tended to make the decade from 1860 to 1870 one remarkable for intellectual progress, and hence of necessity an era favorable to the wide diffusion of literature.

PENS.

THE use of some implement for writing was a necessity immediately on the reduction of the first language to writing, and very various are the instruments which have been used for this purpose as, indeed, it was

necessary they should be, from the great variety of materials on which the writing was to be inscribed. The rock inscriptions found in the Caucasus, in Arabia, in Petra, in Egypt, in India, Burmah, Siam, and China and else-

where, must have been engraved by pointed instruments of the hardest steel; the inscriptions on the softer limestones, steatites or talcose slates of Assyria and Babylon were obviously made with a sharp cutting instrument, and the arrow-headed writing on their bricks was impressed with a punch or die. The tablets of lead, copper, or soft brass, required a steel pointed stylus. The waxen tablets required a stylus of ivory or bone, with a flat blade for making necessary erasures, and when parchment and paper was used for writing purposes, the sharp pointed stick, or later the reed pen was employed to inscribe upon these surfaces the matters which needed to be written. The Chinese used and still use, a Camel's hair pencil charged with the semi-liquid paste, known as India Ink, for the same purpose. The leaves of various species of palm are still used in the East for writing, and a pointed stick and the juice of some berries serve for pen and ink. With the introduction of paper into Eastern Europe in the seventh and eighth centuries, came the employment of the gray goose quill which for a thousand years and more, was the implement for writers and scribblers of all sorts. Yet there were serious objections to the quill pen. Its point was only hard before it had been long soaked in ink, and it was far from being permanent. It is said, indeed, that Dr. John Gill, the famous commentator and theologian, wrote all his thirty or forty ponderous folios with one quill pen, and that an old one when he began; but it does not surprise us to be told by the same authority, that the printer of his works complained that he had been made blind by the effort to decipher Dr. Gill's manuscript. It resulted from this inequality and rapid deterioration of quill pens that when the inventive genius of modern nations was aroused, one of the first things in which improvement was sought was the implement of the ready writer. The points required for a good pen were a firm, indestructible point, great flexibility, non-corrosion of either pen or point, capacity to retain a sufficient quantity of ink to prevent the necessity of constant replenishing, and adaptability to the various tastes of writers. Metals seemed to possess most of these qualities, but the early experiments with them proved failures.

As early as 1803, attempts were made in Great Britain to make pens of steel. They had but a single slit, and were poor affairs,

though quite costly. Silver was tried with a little better success, but the points were too soft and the pen bent very easily. It was, moreover, too costly for general use. The improvements in steel pens made by Mason, Gillott, Perry, Levy, and other manufacturers between 1820 and 1830 and since that time, have rendered these useful little articles of great service to the world. By the use of machinery and the division of labor, their production was so greatly cheapened that they were put within the reach of all. In Birmingham, England alone, nearly 1,500 millions of steel pens are annually made. Large numbers are also manufactured on the continent of Europe. Many attempts have been made to manufacture steel pens in the United States, but without great success. One or two manufacturers have, however, persevered in spite of all opposition and discouragements, and have succeeded in producing by the aid of machinery, a good pen at a fair price. The Washington Medallion pen has attained such a reputation as to be largely counterfeited in Germany and England. But the steel pen, popular and cheap as it has been and still is, does not answer all the requirements of a good pen. It is in its best estate wanting somewhat in the pliancy of the quill; it deteriorates rapidly on use, so that the handwriting can never be precisely the same on two successive days, and it soon corrodes and becomes entirely worthless. Permanency and uniformity in execution are the indispensable requisites for a perfect pen.

It is not surprising then that attention should early have been turned to gold as most likely to fulfil these requisites. The first attempts were like those in steel, failures. The first gold pens were made by John Isaac Hawkins, an American residing in England, about 1825. Mordan, the English pencil case maker, also attempted to make them not long after, but his pens were inelastic and poorer than Hawkins'. The use of iridium and osmium points to these pens is due to Mr. Hawkins, who soldered them on to the points of the pens he made. Rev. Mr. Cleveland, an American clergyman, visiting England, purchased of Hawkins his right to make gold pens in 1835, and on his return induced Levi Brown, a watchmaker in Detroit, to undertake their manufacture. At first Brown met with little success, but in 1840, he removed to New York and there the business grew in im-

portance. The pens made were, however, very unsatisfactory, and would be now considered worthless except for old gold. About 1844, Mr. John Rendell, an employe of Brown, commenced making machinery for the manufacture of pens, which up to that time had been made almost entirely by hand. A. G. Bagley and a Mr. Barney, Mr. Leroy W. Fairchild, Mr. Spencer and Mr. Dixon, both of whom were subsequently associated with Mr. Rendell, engaged in the manufacture between this period and 1851, and soon after several others commenced operations in a small way. Very many inferior pens were thrown upon the market, but those made by the machinery of Rendell, improved by Fairchild, had a very good reputation. One of Fairchild's improvements consisted in bedding the iridium points in the gold instead of soldering them as had been done at first. In 1859, there were in the United States thirteen gold pen factories, eight of which were in New York, and one in Brooklyn. There were also two in Connecticut, one in Massachusetts, and one in Cincinnati. Five or six of these made pens of very fair quality, the rest produced only inferior goods, and most of them worthless trash.

In 1851, Alexander Morton, who had previously been in the employ of Mr. Bagley, commenced the manufacture of gold pens on his own account in New York City, and very soon by his inventions for tempering and finishing them with perfect uniformity, took the position which he and his successors have maintained to this day. For the first time in the history of the manufacture, gold

pen making was reduced to an exact science. Previously even the best makers could not duplicate a pen. Its exact temper and elasticity, and its perfect writing qualities were beyond their control, and hence the selection of a pen was a matter which must be attended to in person. Mr. Morton brought his machinery to such perfection, and was so exact and thorough in every department of the manufacture, that he could at once decide by a glance at the handwriting of a customer what grade of pen would best suit him, and introduced the practice of filling individual orders by mail, and in the ten years, 1860-1870, forwarded some millions of pens in that way. There are now a very considerable number of manufacturers of gold pens in this country, some of them formerly employes of Mr. Morton, but while some of them make very good pens, there is no uniformity about their manufacture, and most of them lack that permanent temper and elasticity which are the result of Mr. Morton's processes. This peculiar excellence of Morton's pens has been recognized by English bankers and clerks, among whom these pens have the highest reputation. We desire to be understood in regard to this matter. The other pen manufacturers may, and we presume do, make occasionally, pens as good as those made by the Morton process, but they cannot do it uniformly by any other method. We have no means of knowing what has been the comparative success of the different manufacturers, nor is it a matter of any consequence in this work. It is only the perfection of the product which concerns us.

BOOK-BINDING.

CHAPTER I.

BOOK-BINDING.

THE binding of books is an art probably older than the art of book printing itself, since there existed a necessity for confining the manuscripts and scrolls that were the medium of preserving thought in ancient days. Even that was a progress, however; since the slabs of stone that bore the divine

commandments could not have needed binding, nor could the rocks and bricks, on which the Babylonians traced their ideas, have well been bound. The different modes of conveying and preserving ideas, that were adopted in different ages and nations, caused recourse to be had to almost all materials according to exigencies, and these were preserved according to the exigency.

The books of wood, or metal, were bound

by fastening the sheets of which they were composed at the backs by hinges. When parchment and paper succeeded, the backs of the sheets were sewed together, and the covering varied as the arts progressed and materials were adopted. The art itself has made material progress only of recent years. It came to be a separate art only when the discovery of printing, by multiplying books, made the binding of them too laborious for those who did it when years were spent in copying one book. In 778, Alcuin, a monk, native of England, commenced to copy the Bible, and finished it 800, for the Emperor Charlemagne. When twenty-two years was required to make one copy, there was not much business for the binder, whose labors commenced with those of the printing press. While books were still comparatively dear, the binding bore a small proportion to the cost. Of late years, the tendency has been toward neatness and durability. The requisites of a well-bound book are solidity, elasticity, and elegance. Among the nations of Europe, the French take the lead in artistic taste, but the English excel in the expensive finish of the more costly editions. In the United States, machinery is employed, more than elsewhere, to attain the desirable result at less cost.

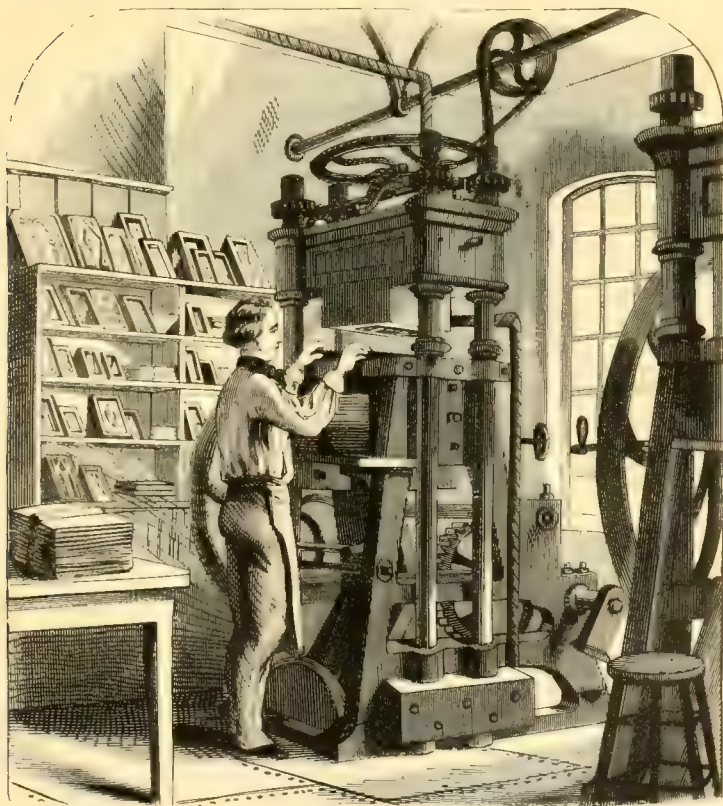
Books are printed upon paper of various sizes, which formerly were three, called royal, demy, and crown. The book took the size indicated by the paper used. The demy size was mostly used, and the sheets were folded a greater or less number of times. Thus, folded once in the middle, gives two leaves, or four pages, and is called folio. When the sheet is again folded, it gives four leaves, or eight pages, and is called quarto; folded again, the result is eight leaves, or sixteen pages, and is octavo. By folding into twelve leaves, or twenty-four pages, we make a duodecimo; and if into eighteen leaves, or thirty-six pages, it forms octodecimo. Of a size less than this, the books are pocket editions. The sizes of books thus formed are generally designated as 4to, 8vo, 12mo, 18mo, 24mo, 32mo, 48mo, etc. The size of the printed page corresponds with the size of this fold. Thus, the size of this volume is royal octavo, being printed on paper a size larger than demy, or ordinary octavo. Each sheet of paper contains eight leaves, or sixteen pages; and there are fifty of these sheets in the book. Thus, the type is composed of sixteen pages in one "form,"

and one side of a double sheet receives the impression of those sixteen pages by one movement of the press, and then, being reversed, receives an impression on the other side from the same type. As the sheets leave the press they are hung up to dry, when they are placed under a hydraulic press of great power. They are then counted out into quires of twenty-four sheets each, and sent to the binders. There, in the folding room, the sheets are folded by girls. The object is to fold down the pages, so as to fall one upon the other with perfect accuracy, since upon this the proper binding of the book depends. The whole edition of sheets is folded with great rapidity by one girl. Some of these will fold 400 in an hour, but the average may be 300. A folding machine has lately been introduced, by which, it is said, two girls will do as much as eighteen by hand. Each sheet folded is a signature, and generally these are designated by some figure at the bottom of the first page of each sheet. The folded sheets are laid in piles, in the order of these signatures. The "gatherer" then, with the right hand, takes them, one by one, and places them in the left, until a complete set, or full book, is collected. This is performed so rapidly, that it is said an active girl will gather 25,000 in a day. After this, the sheets are "knocked up" evenly, and pressed in a hydraulic press; but recently, a machine has been introduced, by which time is economized. The engraving, on another page, shows the figure of that by Hoe & Company, which is the favorite for embossing, as well as compressing. The machine runs slower for smashing. The size, 15 by 17, weighs half a ton, and is sold at \$400. The book is now examined by the collector, in order to detect any error of arrangement in the signatures. The books then go to the sawing machine, where, being properly arranged, fine circular saws cut fine indentations in the books, to admit as many pieces of twine, to each of which each sheet is sewed. This is performed by girls, at a table appropriated for that purpose. When the sewing is complete, the "end papers" are pasted on the book.

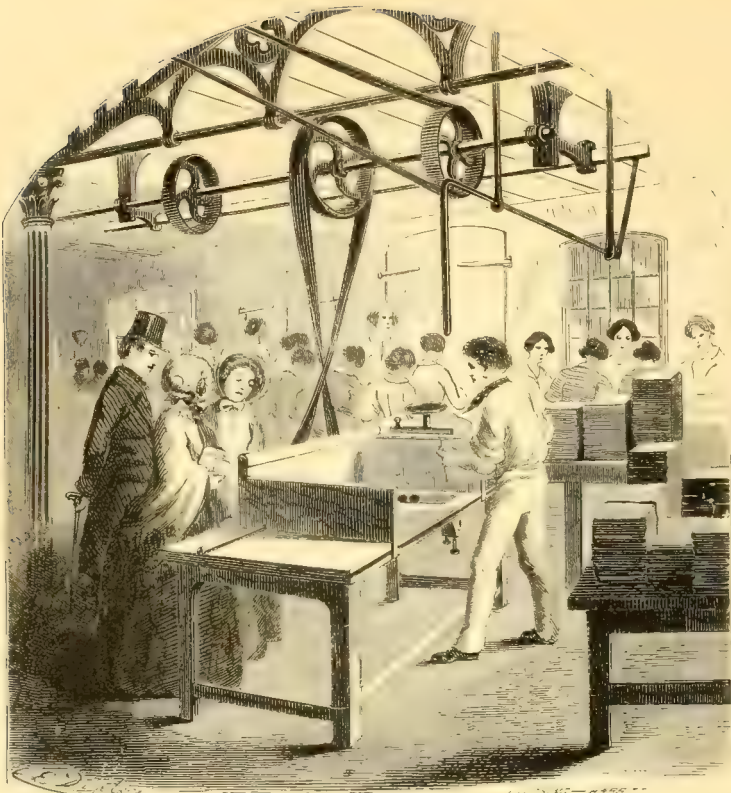
The books next are trimmed by having the edges cut by a machine. To effect this they are piled upon a platform, under a large knife, which, being worked by a crank, descends, like a guillotine, cutting a large number at once. The figure of the trimming machine is given on another page. The



LAYING ON GOLD LEAF.



EMBOSSING PRESS.



SAWING MACHINE.



FINISHING ROOM.

knife used in this machine is 21 inches long, and has a short, vibratory movement; thus combining the advantages of the long stationary knife with those of the ordinary plough. The work to be trimmed is placed against the adjustable guide on the bed of the press, in front of the knife, and is compressed by the wheel and screw. The table, on which the press stands, is adjustable in all directions, and is also self-acting, so that, when thrown into gear, it rises to the required height and disengages itself—thus preventing injury to the knife—and then drops down to its original position. Three sides of the work can be successively presented to the action of the knife, by simply turning the press to the quarter and half-turn stops. The machine can be worked either by hand or steam power, and can be easily adjusted to cut any size from 3 to 18 inches long, and from 1 to 15 inches wide. This machine has been in operation some twenty-five years. The backs now receive a coat of glue, to impart firmness. They are then, by the “backing machine”—which is an improvement of some ten years’ standing—rounded on the back, and receive a groove for the boards. They are then cut on the ends. A piece of muslin, nearly as long as the book, and extending an inch over the sides, is then pasted on, and the book is ready to receive the boards, or cases. These consist of mill-boards cut a little larger than the book, and cloth cut large enough to turn over all. The cloth is glued, and one board is placed upon it. The corners of the cloth are then cut, and the edges turned down and rolled smooth. It is then dressed, when it goes into the hands of the stamper. The stamping, or embossing, is done in a press, from dies previously prepared. When the sides are lettered, the letters are engraved in metal, and impressed upon the cloth. Gold leaf is placed upon the cloth, and the heat of the stamp causes it to adhere in the desired places. The book is then pasted on the sides, placed in the covers, and pressed, when it is a book bound in cloth. The stamping, or, as it is sometimes called, the arming press, will perform, almost instantaneously, what formerly would have required a week. This has been brought about by a combination of the arts—designing, die-sinking, and application of machinery. When a particular design is required upon a book, the artist draws it

upon paper; it is then cut in brass, or steel, and this block in the press embosses a great many covers at a blow.

With books bound in leather, the process is not so expeditious. In order to insure solidity, the books were formerly beaten upon a stone with a broad-faced hammer. They are now squeezed between steel rollers, to effect the same object. The engraving of the rolling machine, in another column, will give a good idea of the one that is now used by bookbinders, in place of screw and hydraulic presses, for pressing folded sheets. The work is placed on an iron table in front of the rollers, between plates of iron, pasteboard, or leather, and passed through the machine as often as necessary. The adjusting screws are geared together, so that the rollers are always parallel to each other. It is strongly geared, and may be run by either hand or steam power. The sewing is done in a more substantial manner. The volume, placed in the laying press, has its back hammered very carefully, so as to spread the sheets on each side of the boards without wrinkling the inside, and the work proceeds until it leaves the hands of the finisher a perfect model. It opens easily, and lies flat out without any strain, and its hinges are without crease.

In gilding the edges of a book, they are scraped smooth and covered with a preparation of red chalk, as a groundwork for the size, which is formed of one egg to half a pint of water. The gold is laid on the size, and then burnished with a bloodstone.

The embellishment of book covers is called “tooling,” and, when plain, blind tooling. By this latter, sometimes glossy black indentations are made to contrast tastefully with the rich color of the morocco. This is performed by wetting the morocco, and applying the tool in a heated state.

There has been a method invented by which the leaves of a book are fixed together with India-rubber instead of sewing. The sheets being cut evenly, receive a solution of the material; as each leaf is held only by the rubber, the book is made to lie very flat. This does not appear to have come into much favor. The fashion of imitating antique styles of binding has led to the use of wood instead of pasteboard, in some fancy styles of costly books. It is only a passing caprice, since wood cannot supplant the pasteboard.

WRITERS OF AMERICA.

CHAPTER I.

THEOLOGIANS—STATESMEN—NOVELISTS
—HISTORIANS.

WITH the settlement of the colonies, there were necessarily but few attempts at literary productions. The Pilgrim Fathers brought with them many books from their native land, but these were mostly bibles and theological works. They were persons whose minds bore the strongest religious impressions. In them the sentiment of piety approached austerity; and they were not unfrequently charged with fanaticism. The time they had to devote to literature was wholly absorbed in the perusal of those devotional works that sustained and illustrated that faith which they had made their rule of action under all circumstances, and which they lived up to with all the sternness of their bold and decided characters. They had encountered the perils of the wilderness to rear free homes; and they were determined, also, to make them temples to the Lord. It is not to be inferred that literature and the finer arts of life were, even at that remote period, foreign to the people of the country. The founders of all the colonies were among the most elegant writers and accomplished scholars of the time. Such men as Raleigh, Baltimore, Penn, Oglethorpe, Smith, Winthrop, and a crowd of others, would have been ornaments to the most brilliant circles of any country: with them and their successors, education and religion were the foremost objects of attention. But among men so busy with the work in hand, as to declare "that the laws of God should govern until they had time to make others," much general literature could not find cultivation. Theological works were the staple, and these were produced with an independence of thought and a vigor of argument which enchained their adherents and astonished the opponents they had left at home. As the laws of God were the models

of government, so were the inspired writers the only guides for the faith of that steadfast people. Those original and strong thinkers were also powerful and prolific writers; and some of them won the first place, in the estimation of the learned, as theologians. Cotton Mather, who had no equal as a scholar, wrote 382 works, of one of which, "Essays to do Good," Dr. Franklin remarks: "It perhaps gave me a tone of thinking that had an influence upon some of the principal future events of my life." Thus was one of the most powerful minds of the eighteenth, or, indeed, any century, impressed with the vigorous style of a colonial author. The simple missionary, Jonathan Edwards, a large portion of whose useful life was spent on the confines of civilization, produced works which, according to Dr. Chalmers, a century afterward, stamped him as "the greatest of theologians," and called from Sir James Mackintosh the remark that, "in power of subtle reasoning he was, perhaps, unmatched among men." Mr. Edwards succeeded to the presidency of the New Jersey College, and died in 1758. He was the type of the theological age of the country. His work became the standard of orthodoxy for enlightened Protestant Europe. That voice, which was indeed "one crying in the wilderness," became the textbook of the most learned divines of the old world.

As the colonies advanced in wealth and numbers, more diversified views naturally sprung up, but the books of amusement and instruction were mostly imported from England. There was little in the rude struggle with the wilderness to foster an independent school of literature, which flourished much better in England, where existed all the resources of libraries and information. That bold and strong natural intellects, like that of Dr. Franklin, should grow up, was almost a necessity of the vigorous race that produced him; and his works were at once ap-

preciated, because they reflected the genius of the people. The clear, strong sense of "Poor Richard" struck a responsive chord in every heart, and there was little reason to be surprised that the almanac reached a circulation of 10,000 in 1735. The school system that had been early established by the colonists, laid a broad foundation for future literature. To make all classes of persons readers, was to create a demand for books that must sooner or later be gratified; and writers and speakers were sure to find the avenue to the public mind when the occasion offered. This presented itself when the disputes with the mother country began to take a serious form. Those events stirred the depths of feeling in all ranks and classes, and an army of orators rose into public view at once, to fan the flames of discontent into a conflagration that ultimately consumed the loyalty of the colonists, and left their original sturdy independence of character to assert itself in political separation. The eloquence of Otis, of John Adams, Patrick Henry, Samuel Adams, of Pinckney, of Rutledge, and others, live for us only in the effects they produced, and of which our institutions are the manifestation. Unhappily there were then no means of reporting by which those soul-stirring speeches could be preserved, and we have but a few sketches of Fisher Ames and Patrick Henry. While those illustrious men roused the nation with their voices, numbers aided with their pens; among these, Thomas Paine's pamphlet, "Common Sense," and his series of tracts entitled "The Crisis," produced a marvellous effect. The papers in themselves, at the present day, give no evidence of great ability, but they were fitted to the epoch with extraordinary aptness; and tradition assures us that each, on its appearance, produced a *furore* difficult to conceive. The epoch was one of intense excitement; and those papers held up clearly the dark side of kingcraft to a people in whose minds republicanism was making rapid growth. The pamphlets and papers that circulated at that period were, some of them, marked with great learning and power. The correspondence then carried on among public men, and which has since been collected and given to the public, surpasses in learning, political sagacity, grace of diction, vigor of thought, and power of expression, any thing of the kind that ever before appeared in any country. We, that read those papers by the light of seventy years of sub-

sequent history, are better able to appreciate the extraordinary ability they evince. The letters of Franklin, Jefferson, Jay, Adams, Washington, Morris, and others, will, while the nation lasts, be preserved as models of literary excellence. The publication of the "Federalist" was an era in political writing; the work was the joint production of Alexander Hamilton, James Madison, and John Jay. The papers were signed "Publius," and their object was to urge the importance of union in the adoption of the constitution. The statesmen of Europe regarded the work with admiration; and the *Edinburgh Review* remarked: "It exhibits an extent and precision of information, a profundity of research, and an acuteness of understanding which would have done honor to the most illustrious statesmen of ancient or modern times." In his work on "Democracy in America," De Tocqueville remarks that "it ought to be familiar to the statesmen of every nation." If the reader of the present day is struck with the clear-sighted sagacity that the papers evince, how much greater is our admiration when we reflect that those statesmen were reared in our colonial state, without any of that experience which has shed its light upon us. The wisdom they displayed was the result of their own profound deliberation. The writings were an interchange of views between a race of intellectual giants who were giving birth to a nation. The works of James Madison comprise fifteen octavo volumes of 600 pages each, and are distinguished for soundness of reasoning, and great sagacity. The report of Hamilton, as secretary of the treasury, on banks and manufactures, was of great celebrity; and, as far as it described the existing state of affairs, was valuable. It is to be borne in mind that he was one of a race of Titans who were organizing a nation of a kind that never before existed; and if the views he advocated have not been justified by the experience that the nation has wrought out in the last seventy years, it is not surprising; nor can his great wisdom be taxed on that account any more than the vast ability of Patrick Henry be questioned because he opposed the new constitution. The writings of Jefferson, the statesman and patriot, were of a nature more durable and statesmanlike than the effusions of Hamilton, which were more the products of a subordinate executive officer than a directing head. The pen which wrote the Declaration

of Independence and the state papers, wrote, also, the "Notes on Virginia," the autobiography, correspondence, and Anas, included in the four volumes of his works published after his death by Mr. Randolph. Of the same age as these eminent statesmen, was John Marshall, the celebrated chief justice of the United States. Judge Marshall appeared as an author in 1805, when he published his "Life of Washington." The introductory volume, being a "History of the Colonies planted by the English on the Continent of North America," was published separately in 1824. In 1832 an abridgment of his "Life of Washington" appeared. Mr. Marshall occupied the posts of minister to France and secretary of state, and his state papers commanded admiration as of the very highest order. His appointment and career as chief justice seems to have been one of those special providences that have so often manifested themselves on behalf of the United States as a nation. The powers of the Supreme Court are such as were never before, by any people, confided to a judicial tribunal. It determines, without appeal, its own jurisdiction, and that of the legislature and the executive. It is not merely the highest court in the whole country, but the constitution of the country is in its hands. This tribunal was to decide upon every question that should arise under the new constitution, in relation to all the rights and powers of each department of government, and also those of all the states. A want of ability or of integrity upon the part of the court, possessed of such power, might, by vicious interpretation, have destroyed the whole fair fabric that had been raised with so much care and wisdom. This immense responsibility devolved upon John Marshall, and nobly did his great capacity and sterling integrity meet the occasion. During thirty-four years, that great man decided every question that arose; and, so to speak, fairly launched the constitution and government upon the stream of time.

Cotemporary with Judge Marshall, upon the supreme bench, was Joseph Story, who, born in Massachusetts in 1779, was appointed in 1811, and held the office until his death in 1845, a period of thirty-four years, during twenty-four of which he was associated with Judge Marshall, and displayed talents worthy of such a colleague. His literary writings were published in 1835, comprising sketches of eminent men, and other papers.

The eminent statesmen who have adorned

the literature of their country, have been many. Henry Wheaton, Esq., who was born in 1785, served the country in many capacities. He published the most complete work on international law, in 1835. John Quincy Adams, one of the most remarkable men of the country, was born in Braintree, July, 1767, while his great-grandfather, who was born in the reign of Charles II, yet lived. Mr. Adams graduated at Harvard College in 1787, just 100 years after the birth of his great-grandfather. He chose the law as a profession, and began to write for publication over the signature of "Publicola." He replied to some portions of Paine's "Rights of Man." Washington appointed him minister to the Netherlands from 1794 to 1801. He had, also, appointed him to Portugal, but while on his way, his destination was changed to Berlin by the accession of his father to the presidential chair. While in Berlin, Mr. Adams became acquainted with German literature. A series of letters at this period to his brother in Philadelphia, was afterward published. They were of high interest. Subsequently, he was a member of the Massachusetts legislature, and professor of oratory at Harvard University. He was appointed minister to Russia by President Madison. From thence he was transferred to Ghent, to negotiate peace in company with Messrs. Bayard, Clay, and Gallatin. Afterward, he was appointed minister to St. James. He was eight years in the cabinet, and four years president. In 1831, he was sent to the House of Representatives, where he remained until his death, in 1848. He filled more of the high offices of government, than any other man in the country. The largest portion of his published writings consists of orations and miscellaneous discourses of a high character. He gave to the world some essays upon Shakspeare; also, translations from the German of Wieland. In 1832 he published "Dermot Mac Morrogh; A Tale of the Twelfth Century," with some shorter poems, chiefly lyrical. All the writings of Mr. Adams display the most mature scholarship, but the statesman seems to have overshadowed the man, since it is probable that from a less eminent person they would have been more highly considered.

William Wirt was born in 1772, at Bladensburg, Maryland, and became a lawyer in 1792, in which profession he was eminently successful. In 1802, he wrote the

"British Spy," which had a great success. In 1807, he earned a great reputation by his famous speech in favor of Blennerhasset. He produced many works before he gave to the world his extraordinary "Life of Patrick Henry" in 1817. That work has an enduring reputation.

Daniel Webster, that type of New England intellect, was born in 1782, in the same year with Audubon, the great American naturalist. He was a New England farmer's son, of Salisbury, N. H., and pursued learning with the indomitable energy of his race—teaching school as he himself acquired learning—forcing his way to notice, until he acquired a world-wide reputation. His earliest literary performance was in 1806, when 24 years of age, being a Fourth of July oration. He was a contributor to the *North American Review*, and his orations on different occasions were eagerly read in every section of the country. No speeches were more fraught with wisdom and eloquence, or had greater influence upon the public mind, since, being models of their kind, many are daily read in the public schools. He is so thoroughly American, and so in earnest in his expositions of the constitution, that his name, to use his own expression, must ever have an "odor of nationality." He speaks always to the understanding, and always with effect.

In the same year in which Webster was born, South Carolina gave birth to her great statesman, John C. Calhoun. He was born in Abbeville district, in March, 1782. He graduated at Yale College in 1804, and began the study of law, in which he attained great success. In 1809, he was elected to the state legislature. In 1811, he was elected to the House of Representatives, immediately taking a foremost post, until 1817, when he became secretary of war under Mr. Madison, and so continued eight years. Subsequently, he was twice elected vice-president, the last time in 1828. He soon resigned for the Senate, where he continued until his death, in 1850. Mr. Calhoun was one of the most extraordinary men of the country, and one of those whose works will live far into posterity. His eloquence was of a most refined cast, and distinguished for its compact reasoning. He was possessed of that quickness of perception and subtleness of argument, which made Jonathan Edwards the first of theologians. His works have been collected since his death, in six volumes.

Cotemporary with Webster and Calhoun, were the great orators, Clay, Mangum, and others, whose speeches belong to the standard literature of the country, but who have not contributed to it directly by writing. Thomas H. Benton, the great Missouri senator, was born in North Carolina in 1782, and pursued the study of law. In his "Thirty Years' View" of the American government, he has contributed a work of great value to the historical literature of the country. That great work is not only a faithful record of the political history of the country for the thirty years, but the clear Saxon style in which it is composed, gives it a charm seldom found in similar productions. When this work was completed, he commenced the task of condensing, reviewing, and abridging the debates of Congress, from the foundation of the government, which he lived to bring down to the compromise measures of 1850. With a strong intellect and bold character, Col. Benton was well calculated to dominate in the western states. In Missouri, at one time, his power was boundless.

The brothers Everett have deservedly occupied a high place among the literary men of the country. The elder, Alexander, was born in 1790, in Boston. He graduated at Harvard in 1806, and pursued the profession of law, but filled many offices of public trust, being minister to China at the time of his death, in 1847. During his life, his attention was never long diverted from literature, and his writings were numerous in the *North American Review*, of which his brother, Edward, was editor, and elsewhere. Edward Everett was born in 1794, and graduated at Harvard in 1811. He began the study of law, but adopted theology, and at 19 years was called to the Brattle street church, Boston, to fill the vacancy caused by the death of Mr. Buckminster, one of the most remarkable orators of modern times. He was soon after elected Greek professor at Harvard. While filling that office, he published some school books. In 1820, he became the editor of the *North American Review*, to which he largely contributed. He became member of Congress, and afterward governor of Massachusetts. He was minister to England, president of Harvard College, and United States senator. Like his brother of opposite politics, he has enjoyed a succession of offices, and was, in 1860, the candidate of a large party for the vice-presidency. When Lord

Macaulay, from over occupation, declined to add a memoir of Washington to the many brilliant biographical papers he prepared for the new edition of the "Encyclopædia Britannica," he suggested to the publishers of that work, that his friend Edward Everett would be the very man to execute the task. He prepared the paper, which was subsequently republished here. Mr. Everett died in 1865, in the height of his fame.

John P. Kennedy, was born in Baltimore, Md., Oct. 25, 1795. He pursued the law as a profession; was a member of Congress 1837-9, and 1841-5, and Secretary of the Navy in 1852. He was one of the most genial and popular of writers. He was, perhaps, best known as the author of the "Memoirs of William Wirt," published in 1849, a "Defence of the Whigs" 1841, "Horse Shoe Robinson," 1835, and "Rob of the Bowl," published in 1838, followed by "Annals of Quodlibet," in 1810. His delineations of nature were truthful, and his character-drawing marked with great delicacy and freedom. He died in 1870.

Hugh S. Legaré was born in South Carolina, in 1797, and graduated at the South Carolina College, following the law as a profession. He died in 1843. In 1820, he was sent to the state legislature, and subsequently was appointed attorney-general of the state, was made chargé d'affaires at Brussels, and chosen to Congress in 1836. His contributions to the *New York Review* gave him a high literary reputation. In 1846, a collection of his writings was published in Charleston, establishing his high reputation as of the first class of intellects.

There are a number of others of our statesmen and political men, who have contributed by their writings to the literary capital of the country, but we have here selected only the most prominent of them.

Of those who have made literature a profession, Charles B. Brown seems to have been the first. He was born in 1771, in Philadelphia, and was of very early promise. In New York, in 1793, he was introduced to a literary society, which numbered among its members James Kent, afterward chancellor, Dr. Mitchill, Dunlap, Bleecker, and others. In 1797, he published a work on the rights of women, which then found less favor than some writers on the same subject have more recently experienced. He published, subsequently, a number of works that met with no very great success.

A year younger than Daniel Webster was Washington Irving, born in N. Y. City, April 3, 1783, died in 1859. Mr. Irving, "the prince of story tellers," is the admitted leader of American literature. His first publications were in 1802, over the signature of Jonathan Oldstyle, Gent., in the *Morning Chronicle*, of which his brother was editor. In 1806, in connection with James K. Paulding, he began writing "Salmagundi." This created a great sensation. It attacked, with amusing ridicule, the ignorance, presumption, and vulgarity of the British tourists, and satirized pretenders at home and abroad in a most effective manner. He soon after commenced the "History of New York, by Diedrich Knickerbocker," which must ever remain the finest monument of his genius. He was connected in business with his brothers, and upon the failure of the firm, he was, happily for the public, forced to depend upon literature for support. His next production was the "Sketch Book," published in New York and in London, in 1819-20. Its success was great at home and abroad, fully establishing the fame of the author. From that date, his works appeared at pretty regular intervals, although he was absent from the country seventeen years, up to 1832. Soon after, he purchased the old mansion of the Van Tassels, on the Hudson, near "Sleepy Hollow." He then resumed his literary labors until his appointment as minister to Spain, in 1841. He returned, in 1846, to his residence, and remained there until his death, still continuing, at times, to add to the list of his productions, the last of which was the "Life of Washington," which has had a sale probably as extensive as all the rest of his works, and the aggregate of which will exceed half a million volumes. It may be said that he has been one of the most successful of authors.

James K. Paulding, the colleague of Irving in "Salmagundi," was four years his senior, having been born in 1779, in the town of Pawling, on the Hudson. Notwithstanding the great success of "Salmagundi," the publisher refused to remunerate the writers, and it was brought suddenly to a close. In 1813, Mr. Paulding published a satirical poem, called "The Lay of a Scotch Fiddle," and in 1816 the most humorous of his satires, "The Diverting History of John Bull and Brother Jonathan," was published. His works were numerous up to 1831, when the "Dutchman's Fireside" appeared, meeting

with great success. It is called the best of his novels. This was followed by "Westward, Ho!" in which his characters are drawn with great truth and vigor. His sketch of the Kentucky hunter in his comedy of "Nimrod Wildfire," has met with great popularity. In 1837, Mr. Paulding became secretary of the navy under Mr. Van Buren. On his retirement he resumed his pen, and some of his later productions were contributions to the *Democratic Review*. All the works of Mr. Paulding would probably reach some thirty volumes. His works evince great descriptive power, skill in character drawing, with much humor and a strong natural feeling running through them all. Mr. Paulding died in 1860.

James Fenimore Cooper, the most widely known of American novelists, as well as the most distinguished, was born in 1789, at Burlington, New Jersey. He became a student in Yale College in 1802, in the same year with John C. Calhoun. On quitting college, in 1805, he entered the navy as a midshipman, for which position his daring and open-hearted nature seemed to fit him. He was very popular in the service, and a most promising officer, when, after six years of sea service—more than many old officers see in a whole life-time—he resigned, married, and finally retired to Cooperstown, N. Y. His first work was "Precaution," which had success, but not that eminent success that attended his subsequent works. His next work was the "Spy." This was decidedly the best historical romance ever written by an American, and its success was immense. Notwithstanding many attempts of the press to speak slightly of it, it created a *furor* in the public mind, and imparted an immense impulse to literature. The work was immediately republished in all parts of Europe, and it demonstrated the fact that everybody read "an American book," since even in England it rivalled the Waverley Novels in popularity. A few years before his death, Mr. Cooper received information that it had been translated into the Persian, Arabic, and some other oriental languages. When it is remembered that this story was a life picture of the struggle for independence, the effect of such a wide-spread circulation among readers under every form of government, may be estimated.

In 1823, the "Pioneers" made its appearance, commencing that series of Leatherstocking tales that will last while the coun-

try stands. The next work of Mr. Cooper's opened the series of his sea tales, in which he stands confessedly without a rival. Those two lines of romance, the American forest and the domain of Neptune, Mr. Cooper made peculiarly his own, and they both illustrate scenes peculiarly American. The "Pilot," it is said, originated in the fact that the "Pirate" of Sir Walter Scott having recently appeared, the conversation turned upon the faultiness of the sea delineation, and Cooper undertook to write a sea story in which the seamanship could not be criticised, and the "Pilot" resulted. Its success was unbounded. The next work was "Lionel Lincoln," a story of the war during the British occupation of Boston, and although it was quite equal to the "Spy," yet for some reason did not take with the public in so great a degree. In 1826, the "Last of the Mohicans" was produced, and it had a success from the first, greater than any novel had ever before had. It was purely original, introducing for the first time upon the field of literature, that race of men of whom but a few years will leave only the tradition. In the "Pilot," a real seaman for the first time came upon the stage, in the person of Paul Jones; and in the "Mohicans," the red man made his *début* in the person of Uncas. Mr. Cooper immediately took rank in England as one of the first romance writers of this, or any other age. Like the "Spy," it was reproduced in every language of Europe. The "Prairie" appeared next, while Mr. Cooper was in Europe, and it carried the reputation of the writer to a still higher point. That work was succeeded by the "Red Rover," which was followed by the "Water Witch." The labors of Mr. Cooper continued up to 1839, when his "History of the American Navy" appeared. It had a great and deserved success. It is a noble monument to the gallant service which, springing from the bosom of a newly formed country, successfully grappled with the tyrant of the seas, and demonstrated to the world that a new power had arisen to redress the balance of the old upon the ocean. There followed this work a continuation of the Leatherstocking tales, in the "Pathfinder" and the "Deerslayer," both of which sustained the high reputation of the series. The complete works of Mr. Cooper embrace a great number of volumes. Not all of them are of the high grade of those which have given him a world-wide character. There is not

a language in Europe into which they were not all translated as soon as they appeared in London. The readers of books in South America, in India, throughout England, and in Russia, are familiar with the name of Cooper, even where America is only known as his home.

James Hall, born in Philadelphia in 1793, died in 1868, made many contributions to our literature. He was the author of "Legends of the West," "A History of the Indian Tribes of North America," "The Wilderness and the War Path."

The years 1804 to 1810 were prolific in the production of authors. Not less than ten distinguished writers were born in those years : Theodore S. Fay, Geo. B. Cheever, Chas. F. Hoffman, C. M. Kirkland, Nathaniel Hawthorne, N. P. Willis, H. W. Longfellow, W. G. Simms, Joseph C. Neal, S. M. Fuller. Mr. Fay was educated for the New York bar, and published first, in 1832, "Dreams and Reveries of a Quiet Man," and essays written for the *New York Mirror*, in which he was associated with Willis, Gen. Morris, Rufus Dawes, etc. His novel of "Norman Leslie" is better known. In 1837 he produced the "Countess Ida;" subsequently, "Hoboken; a Tale of New York." He has spent most of his life abroad, under government appointments.

Rev. Dr. Cheever was born in Maine, in 1807, educated at Bowdoin College and Andover Seminary. He preached first at Salem and afterwards in N. Y. City, but has for some time past been without a charge. He travelled extensively in Europe and has written several interesting volumes of travels, and a number of religious and controversial works. He now resides in New Jersey.

Charles F. Hoffman was born in New York in 1806, graduated at Columbia College, and commenced the study of the law. He began his literary career as editor of the *New York American*, associated with Charles King, Esq., since president of Columbia College; and in 1835 published "A Winter in the West," which met with great success both in London and in New York. This was followed by "Wild Scenes in the Forest and the Prairie," and subsequently by "Greyslaer." Mr. Hoffman established the *Knickerbocker Magazine* in 1838. In 1843 he published "The Vigil of Faith;" and later several songs and essays. Since 1850 he has been hopelessly insane.

Nathaniel Hawthorne was born in Salem in 1804, and graduated from Bowdoin College, in Maine, in 1825. In 1837 he published "Twice Told Tales," that had previously appeared in periodicals, in book form. In 1846 a new collection of his magazine papers was published, under the name of "Mosses from an Old Manse." He had a custom-house appointment in Boston, under Collector Bancroft, and subsequently joined the Fourierite community at "Brook Farm," Roxbury. Afterward appeared "The Scarlet Letter," and "The House of Seven Gables," which confirmed his rank as one of the great masters of romance. He was one of the most distinguished of American writers; and was appointed consul to Liverpool by President Pierce. In 1851 he published "True Stories from History and Biography;" in 1852, "The Snow Image;" in 1853, "The Wonder Book;" in 1859, "The Marble Faun." Mr. Hawthorne died in 1864.

N. P. Willis was a native of Portland, but went early to Boston; whence he entered Yale College, where he graduated in 1827. He was then engaged by S. G. Goodrich, since known as "Peter Parley," to edit "The Token." About the year 1830 he was appointed *attaché* of the American legation at Paris; in which capacity he collected the materials for "Pencilings by the Way," which was first published in the *New York Mirror*. In 1839 he was one of the editors of the *Corsair*, which was short-lived. In 1840 an illustrated edition of his poems was published, and his "Letters from under a Bridge." In 1843, in connection with Geo. P. Morris, he revived the *Mirror*, which lived but a few months. In 1846, the two authors commenced the *Home Journal*, which continues to flourish. Mr. Willis had a wide reputation at home and abroad. While he won the admiration of the most refined taste, he enjoyed a wide popularity as a writer of light literature. Mr. Willis died in 1867 at Idlewild on the Hudson.

Henry W. Longfellow was born in Portland, Me., in 1807. He graduated at Bowdoin College, and commenced the study of the law; but abandoned it for a professorship of modern languages in Bowdoin College, which office he assumed in 1829. He speedily won the reputation of a most graceful poet, as well as of an accomplished scholar. In 1836 he was called to the professorship of modern languages at Harvard

College, which he has since retained. In 1833 he published his translation from the Spanish of the *Coplas* of Don Jorge Manrique. In 1835 he published "Outre-Mer," and in 1838 "Hyperion; a Romance," followed by other poems. The merits of Mr. Longfellow as a poet are of the highest order. Some of his poems have had an unusual success. "Hiawatha" circulated to the extent of 45,000 copies, and the "Courtship of Miles Standish" acquired great popularity.

W. Gilmore Simms was a native of Charleston, South Carolina, and became a lawyer in that city. When only eighteen years of age, he published his first poems, lyrical and others. These were followed, successively, by "Early Lays," "The Vision of Cortes," and, in 1830, by the "Tri color." In 1832, while traveling at the north, he wrote, at Hingham, Mass., his chief poem—"Atalantis; a Story of the Sea." This was followed by the stories of "Martin Faber;" "Guy Rivers: A Tale of Georgia;" "The Yemassee: A Tale of South Carolina;" and these by a great number of poems, historical romances, revolutionary stories, histories and biographies, essays, and reviews—making in all fifty volumes. Mr. Simms died in 1870.

John Greenleaf Whittier was born in Haverhill, Mass., in 1807. His parents were members of the Society of Friends. Receiving a very thorough English education, at the age of twenty-two he became editor of the *American Manufacturer* at Boston, and in 1830 succeeded George D. Prentice in the *New England Weekly Review* at Hartford. In 1831 he published "Legends of New England," and in 1833 returned to his early home, where he published an essay entitled "Justice and Expediency; or, Slavery Considered with a View to its Abolition." In 1836, he became secretary of the American Anti-Slavery Society, and soon after removed to Philadelphia, where he edited for some years the *Pennsylvania Freeman*. Meantime he had been writing some stirring poems, afterward collected under the title of "Voices of Freedom." In 1840 he settled at Amesbury, Mass., and since that time has been a prolific writer of both prose and poetry. His poems have been collected in several forms, and entitle him to rank among the foremost of American poets.

Joseph C. Neal, born in Greenland, N. H., in 1807, became editor of the *Philadelphia Pennsylvanian* in 1831, and, after ten years'

conection with it, started the *Saturday Gazette*. He is best known by a humorous volume—"Charcoal Sketches." He died in 1848.

Fitz-Greene Halleck (born 1785) belonged rather to the period of Cooper and Irving than to the more recent class of poetical writers. He wrote sparingly, but his "Marco Bozzaris" and "Alnwick Castle" will live. He died in 1867.

Edgar A. Poe (born 1811—died 1849) was both a poet and prose writer, a man of extraordinary genius.

James Russell Lowell (born 1819), editor of *Atlantic Monthly*, and later of the *North American Review*, is, perhaps, the ablest of our younger poets, possessing both humor and pathos. His "Biglow Papers" and his more serious poems have great merit. His prose writings are admirable.

Oliver Wendell Holmes (born 1809) has distinguished himself both in prose and poetry. His humor is both delicate and pungent, and his pathetic pieces full of feeling. J. G. Saxe (born 1816) has a high reputation as a humorous poet. Alfred B. Street (born 1811) is a poet of great descriptive power. Of the younger literary men, Bayard Taylor, as traveler, poet, and novelist, occupies a very high rank. R. H. Stoddard, T. B. Aldrich, J. R. Thompson, G. H. Boker, T. B. Reed, W. Allen Butler, and E. C. Stedman, have all won a high reputation.

Among the clerical contributors to general literature, Rev. Timothy Dwight, D. D. (born 1753—died 1817), deserves the first place. In 1774 he published an epic poem, "The Conquest of Canaan," which was followed by numerous lyric pieces. After his accession to the presidency of Yale College in 1795, he published "Travels in New England and New York" in four volumes, the best picture of the life and manners of those times now extant.

Timothy Flint was born in Reading, Mass., in 1780, and graduated at Harvard College, after which he was settled as a minister, but soon departed for the west, where he collected the materials for his "Recollections of Ten Years in the Valley of the Mississippi," which were published in 1826. The success of this work was so great as to induce him to make literature his profession. His next work was "Francis Berrian; or, The Mexican Patriot," followed by the "Geography and History of the Mississippi," in 1827. These works were followed by many

others, and, in 1833, Mr. Flint had charge of the *Knickerbocker Magazine* for some time, after which he removed to Cincinnati, and continued there until his death.

William E. Channing was born at Newport in 1780. He graduated at Harvard in 1798, Judge Story being his classmate. On leaving college, he became a tutor in a family of Virginia. He was ordained pastor of the Federal street church in Boston in 1803, and he continued there until his death in 1842. His earliest publications were theological, particularly one on the "Unitarian Belief," in 1819, which excited great attention. In 1823, he published an essay upon "National Literature." This was followed by "Remarks on the Life and Character of Napoleon Bonaparte." The address delivered in Boston, on "Self-Culture," in 1838, was regarded as one of his best efforts. His later works were religious and reformatory.

Joseph S. Buckminster was born at Portsmouth in 1784, graduated from Harvard College in 1800, became pastor of Brattle street church in 1805, and died in 1812, with a great reputation for eloquence and literary genius, though he had published but little.

Andrews Norton was born in Hingham in 1786, graduated from Harvard in 1804, and was professor of sacred literature, &c. there from 1813 to 1830. He wrote many valuable works, chiefly controversial, and some poems of great beauty.

Horace Bushnell was born in Connecticut in 1802, and graduated at Yale College in 1824. At one time, he was literary editor of the *N. Y. Journal of Commerce*; from 1833 to 1856 he was pastor of a Congregational church in Hartford. His first theological work was published in 1847, and he has since written largely on various topics.

Orville Dewey was born in 1794, in Sheffield, Mass. He graduated at Williams College in 1814. He supplied the pulpit of Dr. Channing when that gentleman went to England. After being settled ten years in New Bedford, he became pastor of the Church of the Messiah in New York, but from 1858 to 1862 was again pastor in Boston. He has published many volumes at different times on various subjects; among others, in 1836, "The Old World and the New;" in 1838, "Moral Views of Commerce, Society, and Politics." He has been one of the most popular pulpit orators that the country has produced.

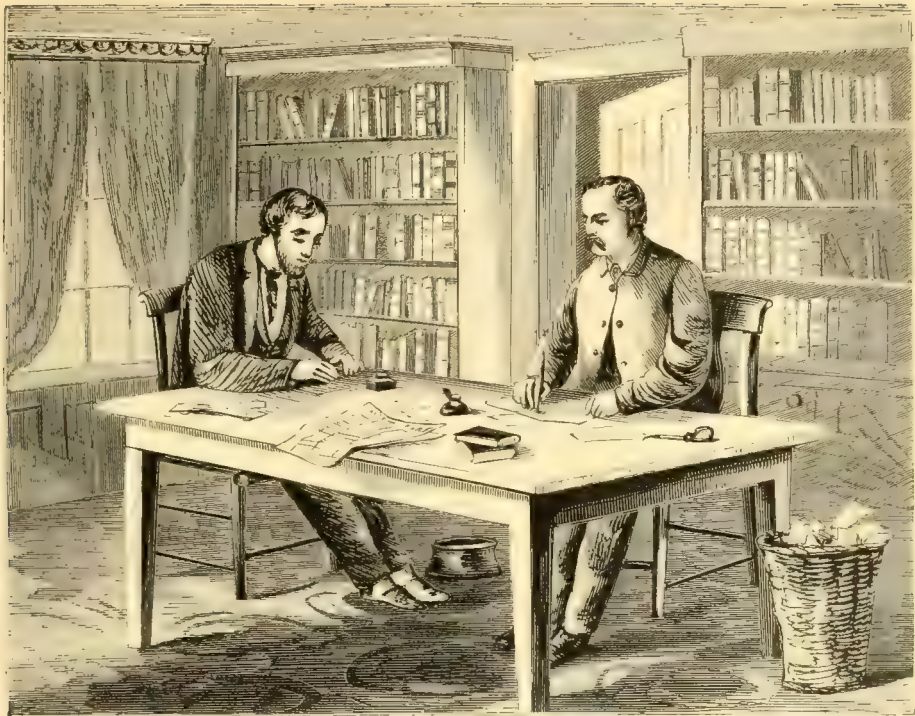
Among the other clergymen who have at-

tained a high reputation for scholarship and literary ability, we should name George Bush, a critical Hebrew scholar, Moses Stuart, Thomas J. Conant, Horatio B. Hackett, all eminent Hebraists; Bennet Tyler, Nathaniel W. Taylor, Lyman Beecher, Edward Beecher, Mark Hopkins, Leonard Woods, George P. Fisher, theological writers; T. C. Upham, J. Torrey, W. G. T. Shedd, Leonard Bacon, Henry B. Smith, Bishop C. P. McIlvaine, W. B. Sprague, J. W. and J. A. Alexander, G. W. Bethune, S. H. Tyng, Francis Wayland and Barnas Sears as religious and ecclesiastical writers; and Nehemiah and Wm. Adams, Richard S. Storrs, Jr., Geo. B. Cheever, Joseph P. Thompson, R. D. Hitchcock, H. W. Beecher, A. L. Stone, Bishops Potter, Burgess, Cox, Doane, and Kip, Richard Fuller, William R. Williams, William Hague, Robert Turnbull, Abel Stevens, J. P. Durbin, W. P. Strickland, Daniel Curry, Stephen Olin, and James Floy, as eloquent preachers and writers. The two Roman Catholic Archbishops Kenrick, Archbishop Hughes, Archbishop Spalding, and Bishops Fitzpatrick and Rosecrans, have all acquired distinction as preachers and authors, mostly on controversial topics.

Francis Wayland was born in the city of New York in 1796, and graduated at Union College. He was first settled over a Baptist church in Boston, but ultimately succeeded to the presidency of Brown University, in 1827. His publications have been numerous on moral and scientific subjects, and he has contributed largely to the periodical press. The editions of some of his works have been very large: 12,000 were sold of his "Political Economy," and nearly 30,000 of his "Moral Science."

William Ware was born in 1797, at Hingham, Mass., and graduated at Harvard in 1816. He was soon after settled in a Unitarian church in New York. He commenced, in the *Knickerbocker Magazine*, in 1836, a series of papers, which were subsequently published together, as "Zenobia; or, The Fall of Palmyra; an historical romance." Then followed "Probus; or, Rome in the Third Century;" "Julian; or, Scenes in Judea," appeared in 1841. The writings of Mr. Ware are graceful, pure, and brilliant in style.

Herman Hooker was born in Poultney, Vt., in 1807. Graduating at Middlebury College, he took orders in the Episcopal church, but, leaving the pulpit soon, removed to Phila-



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phia, where he died in 1865. His books which were all religious, possessed great merit.

Orestes A. Brownson was born in Vermont in 1802. The early life of Mr. Brownson was obscure. He seems, however, to have been very erratic, but published several works, until, in 1838, he began the *Boston Quarterly*, and in 1840 published a metaphysical novel called "Charles Ellwood." He continued to write for many reviews, until, in 1844, he began *Brownson's Quarterly Review*, after having united with the Roman Catholic church. Since then he has achieved a high reputation as a controversialist.

John James Audubon, the great ornithologist, was born in Louisiana in 1782. He was educated in Paris. On his return he immediately commenced the series of drawings, which, with the lapse of time, grew into "The Birds of America"—of which work Baron Cuvier remarked: "If ever it be completed it will have to be confessed that, in magnificence of execution, the old world is surpassed by the new." After encountering many vexations and disappointments, he succeeded in publishing, in 1830, his first volume, containing one hundred plates, representing ninety-nine species of birds; every figure of the size and color of life. The kings of France and England headed the subscription list; he was made a member of the Royal Societies of London, Edinburgh, and Paris, and the scientific world were enthusiastic in his praise. The second volume was published in 1834; in 1840 the fourth and last volume was completed. The whole comprises 435 plates, containing 1065 figures, from the bird of Washington to the humming-bird, of the size of life, and a great variety of land and marine views, carefully drawn and colored from nature. He had spent half a century in completing this marvellous work, and well might he say: "I look up with gratitude to the Supreme Being, and feel that I am happy."

After the completion of this work, he began the "Quadrupeds of America," which was also a marvellous production. His drawings exhibit a perfection never before attempted, and his pen is scarcely inferior to his pencil. When Buffon had completed the ornithological portion of his history, he supposed that he had described all the birds in the world, and remarked that the list "would admit of no material augmentation!" Yet his list comprised but one-sixteenth of those now known to exist. Mr. Audubon died in 1851.

Gulian C. Verplanck was born in 1785, in New York—a true representative of the Knickerbocker race. He graduated at Columbia College, and soon after obtained admission to the bar. In 1818 he came before the public in a literary character, in an address before the New York Historical Society. He became professor of the evidences of Christianity in the theological seminary of the Episcopal church, in 1820. Subsequently Mr. Verplanck, in connection with Mr. Bryant and others, formed a literary confederacy, contributing to the literary magazines and daily journals. At this time was published "The Talisman," mostly by Mr. Verplanck. He was a member of Congress 1825–1833. In 1844–46, he edited a fine edition of Shakspeare, which has a high reputation. Mr. Verplanck died in 1870.

Henry R. Schoolcraft was born in 1793, near Albany, and was early distinguished for his literary and scientific acquirements. He contributed largely to the preservation of the history of the red races of the continent, and was a high authority on all that concerns their customs. He died in 1864.

In the range of history, American writers have won the foremost position among historians of the present century; and European critics admit the high reputation of American histories.

Jared Sparks (1789–1866) was born in Willington, Conn., graduated from Harvard University in 1815, was a tutor there and subsequently pastor of a Unitarian Church in Baltimore, editor and proprietor of the *North American Review*, 1823 to 1830, and already distinguished for his historical researches. He published a life of "John Ledyard, the American Traveler," "Diplomatic Correspondence of the American Revolution" in 12 volumes, "Life of Gouverneur Morris," "Life and Writings of Washington" in twelve 8vo volumes, the "Complete Works of Franklin" in ten volumes, two series of Historical Biographies, one in ten, the other in fifteen volumes, and "Correspondence of the American Revolution" in four volumes. He was very careful, painstaking, and accurate as a historian. He was President of Harvard University from 1849 to 1853.

John Gorham Palfrey, born in Boston in 1796 a classmate of Sparks, graduating from Harvard University in 1815, was a Unitarian minister in Boston from 1818 to 1830, professor of sacred literature in Harvard from 1831 to 1839; editor *North American*

Review 1835 to 1843; Secretary of State of Massachusetts 1844 to 1848; member of Congress 1847 to 1849; lecturer at the Lowell Institute 1839 and 1842; and beside numerous theological and reformatory works published "Progress of the Slave Power," "History of Brattle St. Church," "Life of Col. William Palfrey," "Review of Lord Mahon's History of England," and a "History of New England to 1688," in three volumes, a work of great research.

William H. Prescott was born in 1796, at Salem. He was grandson of Gen. Prescott who commanded at Bunker Hill. In 1814, he graduated at Harvard College, and entered upon the study of the law. At college, by an accident, one of his eyes was destroyed, and the sight of the other much injured. He possessed a handsome income, \$12,000 per annum, and devoted himself to the study of the languages and literature of Europe, and contributed largely to the *North American Review*. Ten years thus passed in a kind of preparation for historical studies; ten years more were occupied with investigation, and then his "Ferdinand and Isabella" was published. The materials for this had been sent him by Alexander Everett, when minister to Spain. The work of acquiring the contents of books and writing without the use of eyes was a severe labor, but was overcome by ingenuity and patience. The work was everywhere hailed with enthusiasm. Mr. Prescott was made a member of the Royal Academy of Madrid, and its rich collections, with those of the archives of Seville, placed at his disposal, and every reservoir of Spanish history laid open to him. The "History of the Conquest of Mexico" followed, and was succeeded by the "Conquest of Peru," and the "History of Philip the Second," which added to the fame of Mr. Prescott. He died in 1859.

George Bancroft was born in Worcester in 1800, and graduated at Harvard in 1817. He commenced the study of divinity, but adopted literature as a profession. In 1834, he published the first volume of the "History of Colonization in the United States." He was subsequently appointed collector of Boston, and in 1844 secretary of the navy, which post he resigned to represent this country at the Court of St. James. During more than thirty years his great "History of the United States" has been in progress, reaching its tenth volume in 1867. He has been U. S. Minister at Berlin since 1869.

William C. Bryant was born in Massachusetts in 1794. He contributed lines to the county Gazette when ten years old, and four years later published two poems; at 19 he wrote his "Thanatopsis." He was for two years in Williams College, and afterwards studied law. In 1825 he edited the *New York Review*, and in 1826 became editor of the *Evening Post*, with which he is still connected. He has written much both in poetry and prose. His prose is remarkable for its purity and elegance.

John Lothrop Motley, who at once took rank with Prescott and Bancroft as a historian, was born in Dorchester, Mass., in 1814, educated at Harvard University, and subsequently at Göttingen and Berlin, studied law, and was admitted to the bar in 1836, but did not practice. He wrote two historical novels, published in 1839 and 1849, was secretary of legation to Russia in 1840, became interested in the history of Holland in 1845, and after collecting material for a history here, went to Europe in 1851, and spent five years at Berlin, Dresden, and the Hague in the composition of his "Rise of the Dutch Republic," published in 1856. This was followed, in 1860, by three volumes of a history of "The United Netherlands," and in 1866, he published two more volumes of this history; minister to Austria in 1861, recalled 1867; minister to England 1869, 1870.

Richard Hildreth (1807-1865) was an able political writer, novelist and historian. He will be longest remembered for his valuable "History of the United States," in six volumes. He was also author of a work on Japan. He was, at the time of his death, U. S. Consul at Trieste.

Benson J. Lossing (born in Beekman, N. Y., in 1813) has attained a high reputation as a historian and historical biographer. His "Pictorial Field Book of the Revolution," his works on Washington and Mount Vernon, Life of "Philip Schuyler," "Histories of the United States," "War of 1812," and "Pictorial History of the Rebellion," are all works of interest and value, and their illustrations are from his own skillful pencil.

James T. Headley, Jacob and John S. C. Abbott, John Foster Kirk, Francis Parkman, J. Romeyn Broadhead, E. B. O'Callaghan, Parke Godwin, Charles Gayarre, Francis L. Hawks, and Amos Dean have all published historical works of some reputation.

Many of the female writers of America have achieved distinction. Mrs. Emma Wil-

lard wrote extensively on history and educational topics, and her sister, Mrs. Almira H. Phelps, has not only contributed several text-books to physical science, but has a fair reputation, as a novelist. Hannah Adams, the pioneer of female writers in America, born 1756, wrote a "History of New England," "Vienna," &c. Mrs. Eliza Leslie (1787–1857) wrote several excellent novels, and some works of great value; in the domain of the culinary art. Mrs. Lydia H. Sigourney (1791–1865) was alike remarkable for her poetical and her prose works; many of the latter were prepared for the young. Miss Catharine M. Sedgwick (1789–1867) was the author of "The Linwoods," "Redwood," "Hope Leslie," &c., novels of great merit. Mrs. Harriet Beecher Stowe (born in 1812) has been the most successful of novelists. Her "Uncle Tom's Cabin" sold to the extent of about 350,000 copies in the United States, and over 1,500,000 in Great Britain, and her subsequent novels, "Dred," "The Minister's Wooing," "Agnes of Sorrento," "The Pearl of Orr's Island," "Old Town Folks," "Old Town Stories," "Pink and White Tyranny," "Harry Henderson's History," etc., etc., have had a large sale. She has also written descriptive, biographical, and other works, and occasional poems of great merit. Her sister, Miss Catharine E. Beecher, has written numerous works, educational and controversial. Miss Susan Warner has achieved a high reputation (under her *nom de plume* of Elizabeth Wetherell) by her novels, "The Wide, Wide World," "Queechy," "The Hills of the Shatemuc," and "Say and Seal," etc. Mrs. S. P. W. Parton (Fanny Fern) has been very successful, not only as a novelist, in her "Ruth Hall," but as a light essayist, in her "Fern Leaves," &c. Miss M. J. Mackintosh, the author of "Charms and Counter-Charms," and numerous other novels, has a high reputation. Mrs. E. D. E. N. Southworth (born in 1818) commenced her career as an author in 1843, and since that time has published over one hundred novels, all of them of considerable merit. Mrs. Ann S. Stephens (born in 1813) has attained distinction as a novelist, as a writer of historical and practical works, and as editor of a ladies' magazine. Mrs. E. Oakes Smith has written largely and well on the most diverse subjects—metaphysics, literature, household matters, criticism, the drama, poetry, and fiction.

Mrs. Lydia Maria Child (born 1802) has been a very popular writer. Her "Hobomok" and "The Rebels" were her earlier efforts, and brought her reputation which was increased by her subsequent works. Mrs. Caroline M. Kirkland (1801–1864) was a graceful and elegant writer. Her "New Home—Who'll Follow?" first introduced her to the public, and her subsequent works enhanced her reputation. Mrs. Alice B. (Neal) Haven (1828–1863) edited the *Saturday Gazette* after the death of her husband, (Joseph C. Neal) and subsequently published a volume of poems and a number of admirable juvenile books.

Mrs. Mary J. Holmes, Mrs. M. Virginia Terhune (Marion Harland), Mrs. Anna C. (Mowatt) Ritchie, Miss A. J. Evans, Misses Alice and Phoebe Cary, Mrs. E. F. Ellet, Mrs. E. C. Embury, Miss Maria Cummins, Miss Caroline Chesebro, Mrs. H. Prescott Spofford, Mrs. E. Robinson (Talvi), Mrs. Catharine A. Warfield, Mrs. Harriet Stuart Phelps, and her daughter, Miss E. Stuart Phelps, Mrs. Elizabeth Stoddard, Mrs. Mary A. Denison, Mrs. M. A. Sadlier, Mrs. Margaret C. Lawrence, Mrs. Madeline Leslie, Miss Caroline Kelly, Mrs. M. E. Hewitt, Miss Virginia F. Townsend, Mrs. L. C. Tuthill, Mrs. Emily C. Judson (Fanny Forester, 1817–1854), Mrs. Helen C. Knight, Mrs. G. Prentiss, Mrs. A. D. T. Whitney, Miss Helen C. Weeks, Mrs. J. D. Chaplin, Mrs. Mary D. Chellis, have all written popular works of fiction, or light literature, which have had a very large sale.

Mrs. S. Margaret Fuller, afterwards Countess D'Ossoli, one of the most vigorous and thoughtful writers of any age, (1810–1850) was for some years in charge of the literary department of the *N. Y. Tribune*, and published beside some translations and many essays, and a work entitled "Woman in the Nineteenth Century."

Several of the ladies named above have distinguished themselves as poets, particularly Mrs. Sigourney, whose religious and elegiac poems have given her a high reputation; Mrs. Stowe, Mrs. E. Oakes Smith, Mrs. Alice B. Haven, Mrs. Emily C. Judson, Miss Alice Cary, and her sister, Miss Phoebe Cary. But there are other American female writers, whose poetry alone has won them high distinction. Among these we may name Mrs. Maria Brooks (Maria del Occident, 1795–1845), whose principal poem, "Zophiel," attracted attention in Europe

from its remarkable curative power; the Davidson sisters, remarkable instances of precocious talent; Mrs. Frances Sargent Osgood (1812-1850), remarkable for her playfulness of fancy and felicity of expression; Miss Hannah F. Gould, (1789-1865) a poet of rare ability and vigor; Mrs. Julia Ward Howe, perhaps the most gifted of our living female poets; Mrs. Frances Anne Kemble (1811-1871); Mrs. Caroline Gilman; Mrs. Sarah J. Lippincott, (Grace Greenwood), whose "Atiadne a Naxos" attracted great

attention from its intensity of passion; Mrs. Amelia B. Welby, remarkable for the exquisite rhythm of her poetry; Mrs. Sarah Helen Whitman, Mrs. Annie C. (Lynch) Botta, Mrs. Estelle Anna Lewis, Mrs. Sarah J. Hale, Miss Caroline May, Mrs. Maria Lowell, Mrs. Mary H. C. Booth, Miss Edna Dean Proctor, Mrs. Rosa V. Johnson, Miss Rose Terry, Mrs. M. S. B. Dana, and Miss Anna Dinker (Edith May). There are others perhaps who deserve a place in this record, but these have all gained a prominent position as poets.

PRINTING-PRESS.

CHAPTER I.

PRINTING PRESS—HANDPOWER— LIGHTNING.

If a middle-aged man now visits the press-room of a "crack" daily, and observes a huge machine, some twenty feet high, driven by a steam engine, delivering seven large newspapers, nicely printed, at every tick of a clock, and watches the piles of paper growing at the rate of 420 per minute, or at that of 25,200 per hour, weighing over one ton, and reflects that the utmost power of the best machines of his youth would require an active man and a boy two long hours to do what this whizzing monster does in a minute, he will form some idea of the progress made in paper printing, and also of what is required to meet a daily demand. In the days of Franklin, the press-work of a paper was a very laborious affair. The machines of that day were very imperfect, and, if reference is had to the illustration on another page, contrasting the actual machine which Franklin used, and which is still preserved in the patent office at Washington, with the fast press now in use, a good idea will be formed of the progress in press-building. In that press, it will be observed, the bed is a platform about three feet high, between two uprights. In the cross-piece at the top is a female screw in which works the screw attached to the wooden platen. This screw being turned by the pressman, causes the platen to ascend and descend.

There is, in front, a table, which slides over the platform at the will of the operator, who, to effect this, turns a crank. On this table was laid the type. Over the type was a frame, which encircled the type, or form, and crossed it in those places where the white margin appears in a printed paper. On this frame the paper of proper size was laid, after being "wet down;" another fold of the frame confined the paper; the whole was then slid on to the platform. The screw being turned, caused the platen to descend, and the impression was made. The screw was then raised, the form slid back, the frame raised, and the paper lifted and examined by the pressman to see if his impression was "good." If it satisfied him, he proceeded to ink his types for a new impression. The ink employed in printing is very different from that employed for writing, and much skill is required in the manufacture. It must be soft, adhesive, and easily transferred; it must dry quickly, and be durable, and not liable to spread. The usual materials are linseed oil, rosin, and coloring matters, lamp-black being used for black ink. The peculiar mode of the best makers is somewhat of a secret. The old mode of applying it was by two ink balls, about the size of a man's hat, made of soft leather, and stuffed with cotton, the leather being nailed round a wooden handle. The pressman, taking one in each hand, daubed them with ink, and worked them together until he had spread the ink. He then applied them to



STATUE OF BENJAMIN FRANKLIN IN PRINTING HOUSE SQUARE NEW YORK

the types as evenly as possible; then, laying them aside, he proceeded, as before, to lay his paper evenly upon the frames, slide it up, work the screw, etc. By this process, an active man could work fifty sheets in an hour; by ten hours steady industry, he could get off an edition of 500 copies for the carriers in the morning. There was little room for much expansion under such a state of printing. The first great advance in the direction of speed, was when the lever was substituted for the screw in making the impression. This was introduced by Mr. John Clymer, and called the Columbian, or Clymer press, in which there was no screw, but the head itself was a large and powerful lever, acted on by proportionate levers, thus bringing to perfection, for presses of a large size, certain principles of leverage which had previously been patented in England, and used in presses of a small size, such as foolscap. The platen was, in fact, a fulcrum for the head, or great lever. Thus the fulcrum and lever superseded the inclined plane, or screw. Mr. Clymer went to England in 1817, and, at that time, the famous "Cobbett's Register" was printed on an "American press," a circumstance that was regarded as a great joke at the time. By this invention, two levers, one affixed at the cross-piece above, and one to the platen, were brought together by a joint, like the bent knee of a man's leg. At this joint was applied a lever, by which the pressman, with one pull, brought the joint into a perpendicular line, by so doing giving an instantaneous and powerful impression. The platen being suspended by spiral springs, instantly rose when the lever was released. The saving in time was immense, one pull of the workman being sufficient for all the old screwing and unscrewing. Improvements in the Clymer press were made by Peter Smith and Samuel Rust, and these improvements are combined in Hoe's Washington press, of which a cut will be found on another page. Inventions of a similar character were made by Mr. John Wells, of Connecticut. The principle of the lever has been applied in various ways, and contains the chief feature in press power. The form of lever now generally used, will be seen in the engraving of Hoe and Smith's printing press, which is the favorite for all work where power presses are not required. Next to the introduction of the lever, was the substitution of the inking machine for the old ink balls. This was

constructed of a cylinder which revolved, by hand, against an ink trough, and, by so doing, received evenly over its surface the ink. The smaller rollers were constructed on a light frame, to which a handle was attached. These, laid upon the ink roller, received from it the ink, and then being pushed forward over the type, imparted it to them with one movement of the hand. This, worked by a boy, is seen in the engraving. The pressman was now relieved of the inking, and, working with a lever, he could print, with active industry, 250 sheets in an hour. The next movement was to make this inking machine self-acting, by attaching it to the press in such a manner that lifting the paper frame would cause it to act.

The Ruggles Job press, introduced in 1839, and the Combination press patented in 1841, both enjoyed a large measure of popularity, but have been of late superseded by other styles, especially those manufactured by R. Hoe & Co., who have been instrumental in making most of the early improvements of late years upon the printing press.

The next important improvement in the machines, was the introduction of the cylinder, or Napier press. In this machine, of which an engraving is presented in another column, the form of type is locked upon a strong iron table, which moves forward and backward, passing in its course under a cylinder, which, made of iron, is covered with a soft blanket, and provided with a set of fingers to seize the sheet as it is presented. Against this is inclined the feeding bench, on which is laid the paper. On the bench is a small brass peg, or pointer, against which the feeder brings the paper accurately, in order that the sheets may "register"—that is, each receive the type at the same distance from the margin. When the cylinder revolves, it raises with its fingers the edge of the paper, draws it round itself, and presses it against the type, which, at the same instant, passes under it. The paper then released by the cylinder, is carried by ribbons to the rear, while the type vibrates back, to return as soon as the cylinder has again drawn forward a sheet of paper. At first, a boy was required to fly the papers, or catch them as they were thrown back from the cylinder, and pile them up. This, by the self-acting flyer, as seen in the engraving, is now dispensed with. This machine raised the number that might be printed to between 2,000 and 3,000 per hour. The bed

is made of a size to take a paper from 25x33 inches, to one 40x60 inches. Very soon an improvement suggested itself to the ingenious and thoughtful inventor. As at first constructed, the type, in moving forward and backward, made only one impression. It was easy to introduce another cylinder, in order to take an impression from the type on its return. This was the double cylinder, which delivers a paper at each end. The cost of these is, for the large size, \$6,850; increased capacity, 3,500 to 6,400 impressions per hour. In this operation, the vibration of the type bed was the great difficulty. The type and bed will weigh over 1,000 lbs. This mass, moving backward and forward with great momentum, produced a great concussion, although it was met by strong springs which stopped its progress and aided its return. Many improvements were made in these springs. The noise and annoyance occasioned by the concussion of the bed against the springs, which are placed at each end of the machine to overcome the momentum of the bed, was removed by means of adjustable India-rubber buffers placed at the points of contact, which in no way interfere with the lively and certain action of the spiral springs. The same object is also effected by air springs, by which the head of the bed, plunging into a receiver, condenses the air, causing it to act as a spring.

It was obvious, however, that the weight and concussion of this bed were a bar to further progress in this direction, and it was felt that greater speed could be attained only by causing the type itself to revolve. This was no new idea. It had been patented in England in 1790, but the inventor could not succeed in holding the types, since the rapid revolution of such a weight gives a powerful centrifugal motion. What they could not do in England, Richard M. Hoe did in New York, in 1847, after many attempts had been made to accomplish the desired result. In this machine, as will be seen in the illustration, the form of type is placed on the surface of a horizontal revolving cylinder of about four and a half feet in diameter. The form occupies a segment of only about one-fourth of the surface of the cylinder, and the remainder is used as an ink-distributing surface. Around this main cylinder, and parallel with it, are placed smaller impression cylinders, varying in number from four to ten, according to the size of the machine. The engraving represents

three. The large cylinder being put in motion, the form of types is carried successively to all the impression cylinders, at each of which a sheet is introduced, and receives the impression of the types as the form passes. Thus, as many sheets are printed at each revolution of the main cylinder, as there are impression cylinders around it. One person is required at each impression cylinder to supply the sheets of paper, which are taken at the proper moment by fingers or grippers, and, after being printed, are conveyed out by tapes and laid in heaps by means of self-acting flyers, thereby dispensing with the hands required in ordinary machines to receive and pile the sheets. The grippers hold the sheet securely, so that the thinnest newspaper may be printed without waste.

The ink is contained in a fountain placed beneath the main cylinder, and is conveyed by means of distributing rollers to the distributing surface on the main cylinder. This surface being lower, or less in diameter than the form of types, passes by the impression cylinder without touching. For each impression, there are two inking rollers, which receive their supply of ink from the distributing surface of the main cylinder, which rise and ink the form as it passes under them, after which, they again fall to the distributing surface.

Each page of the paper is locked up on a detached segment of the large cylinder which constitutes its bed and chase. The column rules run parallel with the shaft of the cylinder, and are, consequently, straight, while the head, advertising, and dash rules, are in the form of segments of a circle. The column rules are in the form of a wedge, with the thin part directed toward the axis of the cylinder, so as to bind the types securely. These wedge-shaped column rules are held down to the bed by tongues projecting at intervals along their length, which slide in rebated grooves cut crosswise in the face of the bed. The spaces in the grooves between the column rules are accurately fitted with sliding blocks of metal even with the surface of the bed, the ends of which blocks are cut away underneath to receive a projection on the sides of the tongues of the column rules. The form of type is locked up in the bed by means of screws at the foot and sides, by which the type is held as securely as in the ordinary manner upon a flat bed—if not even more so. The speed of these machines is limited

only by the ability of the feeders to supply the sheets. The four-cylinder machine is run at a speed of over 10,000 per hour; the six-cylinder machine, 15,000 an hour; the eight-cylinder machine, 20,000; and the ten-cylinder machine, 25,000. This system combines the greatest speed in printing, durability of the machinery, and economy of labor. As we have said, this great machine delivers seven sheets per second, or 420 per minute. It does in one minute what Franklin required ten hours to do, and the papers contain ten times as much matter, and are eight times as large. Thus, to print as much reading would have required 100 hours in the last century, against one minute now. In other words, 6,000 men with 6,000 presses, would have done very badly what this machine does very well.

The next attempted improvement in the speed of machines has been, to do for the revolving cylinder what was done before with the Napier press. In the case of the latter, another cylinder was introduced to take the type on its return vibration, thus getting two impressions from one movement. In the case of the revolving type, something similar has been attempted. It has been stated that the form of type occupies but a segment of the cylinder. It was conceived that by placing the other form on the vacant space of the cylinder, that both would be printed with one revolution, thus doubling the amount of work done by the same number of revolutions. The mechanical part the Messrs. Hoe succeeded in perfecting, but the difficulty encountered was in the paper. It will be conceived that when the paper is printed with such inconceivable rapidity, that the ink has no time to "set," and to impress it on the other side in almost the same instant of time is more than the nature of the operation will permit, and the type "takes off," so to speak, or will not produce a perfect impression. Some other persons made the same attempt, with similar results. Progress in that direction has, therefore, been suspended, but the efforts of genius are being directed anew, and the experience of the past has warned us not to be surprised at what may yet be done. There have been attempts made to simplify the process by fitting stereotype plates to cylinders, and with some success; but under the old plaster process too long a time was required for drying and finishing to permit their use by the daily press. The introduction of

the paper process, (making the dies or matrices in which the stereotype plates are cast, of paper pulp) has effected a complete revolution, and all the dailies of large circulation stereotype their forms.

The weeklies of large circulation, are usually printed on Hoe's large single cylinder press. In these cases, where time is not so much an object, the forms are multiplied by the electrotypes and worked on a large number of presses. In some cases, the circulation running up to 400,000 weekly, a press running 1,500 per hour, or 20,000 in a day, will require ten presses four days to perfect the edition on both sides, and for this purpose, ten separate forms will be required. These machines will take a form $19 \times 23\frac{1}{2}$ inches, and up to 40×57 inches. The cost of the former is : 1,800, and of the latter size, \$3,900.

The press most used for book work differs in principle from either the Napier or the revolving type. It was the invention of Isaac Adams, of Massachusetts, and it bears his name. The type in the press has no movement except slightly up and down. It receives the ink from a self-acting machine, and the paper is fed to it from an inclined plane, when, the impression being made, it is lifted off by the fly and deposited in the rear. It is one of the most perfect of presses. The prices of these vary from \$1,050 to \$6,250 according to size. The engraving on another page will give a good idea of this machine, of which the patent is secured by the Messrs. Hoe.

For the best qualities of book, wood-cut, and color printing, where the wood cuts are printed in the same page with letter-press, the Messrs. Hoe (to whom all the most important of the late improvements in printing presses are due) have produced a "stop-cylinder wood-cut press," which by its numerous rollers and its perfect adjustment, secures the finest possible impressions of the best wood engravings. It has from two to ten form rollers, and from three to twelve distributors, according to size, and by an attachment the rollers may be made to pass over the form two or four times between each impression. There is no jarring of the bed, and by an ingenious device a perfect register is obtained. A "Type Revolving Book Perfecting Press" of their construction is also an admirable machine for the finest book work, but is very expensive. Among other book and newspaper presses of

considerable merit, introduced within the past ten years, are the Cottrell and Babcock, the A. B. Taylor, the A. Campbell, and the C. Potter, Jr. & Co. presses. Messrs. Van-deburgh & Wells, dealers in printing presses

and printers' materials, express a preference for the first two, but all have their good qualities. There are also several new jobbing presses, including two of Hoe's, Gordon's, the Universal, and the Globe.

TYPES.

CHAPTER I.

TYPE FOUNDING—STEREOTYPING—ELECTROTYPING.

THERE has been little change in the general form of metal types used in printing, but much improvement in the quality of the metal used, in the style of the letters, and in the process of casting. There are many sizes of type used, but the ten following are those most used in books and newspapers. They are mentioned in the order of the sizes, the smallest being first:—Diamond; Pearl; Agate; Nonpareil; Minion; Brevier; Bourgeois; Long Primer; Small Pica; Pica. The size of the type employed in this page is Long Primer.

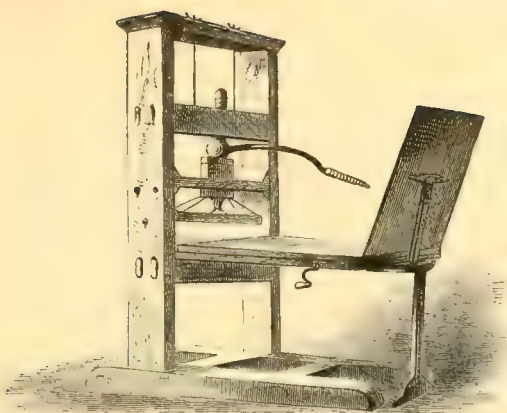
There are some combinations of these sizes; but these are the leading ones most in use. These have not varied much for a long period of time, although the competition among the type foundries has led to the introduction of many styles.

In 1812, on the publication of "The Columbiad," by Joel Barlow, a size of type, known as Columbian, was cut for the work, which was designed to be very perfect. It was embellished by Robert Fulton; and it was the first ever printed upon Clymer's newly invented press, which press took the name of the Columbian in consequence.

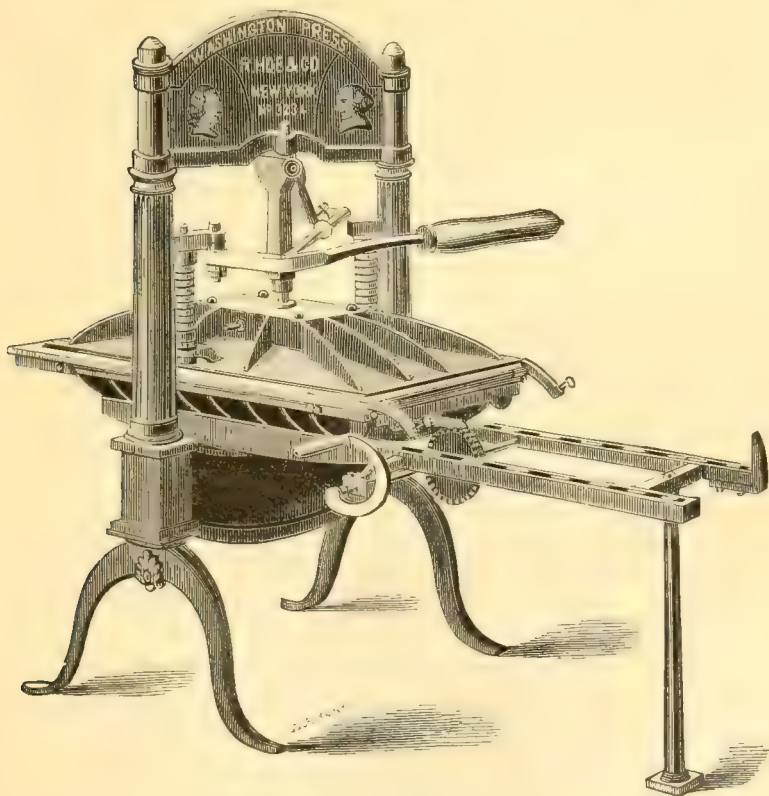
The casting of the type was, until within fifteen years, done by hand for each separate letter. The matrix of the type is of copper, $1\frac{1}{2}$ inches long, $\frac{1}{8}$ of an inch deep, and of the breadth of the type to be cast. The form of the letter is made in the end of the copper matrix by a steel die. The copper matrix is then inclosed in a wooden box, which has a hopper to admit the melted metal. There is a spring attached, by which the matrix may be opened to release the letter when cast. The caster, holding this in his left hand, takes from the furnace, with a very small iron ladle or spoon, about as

much of the metal as will form one letter. This he pours in, and at the same time gives the matrix a smart upward jerk, which settles the metal into the finest cuts of the letter. He then presses the spring, hooks out the letter, closes the matrix, and proceeds as before. A skilful man will in this way cast 500 types in an hour. In 1811, Mr. David Bruce received a patent for an improvement in the mould, by which 25 per cent. more work was done. This system has changed since the introduction of machinery.

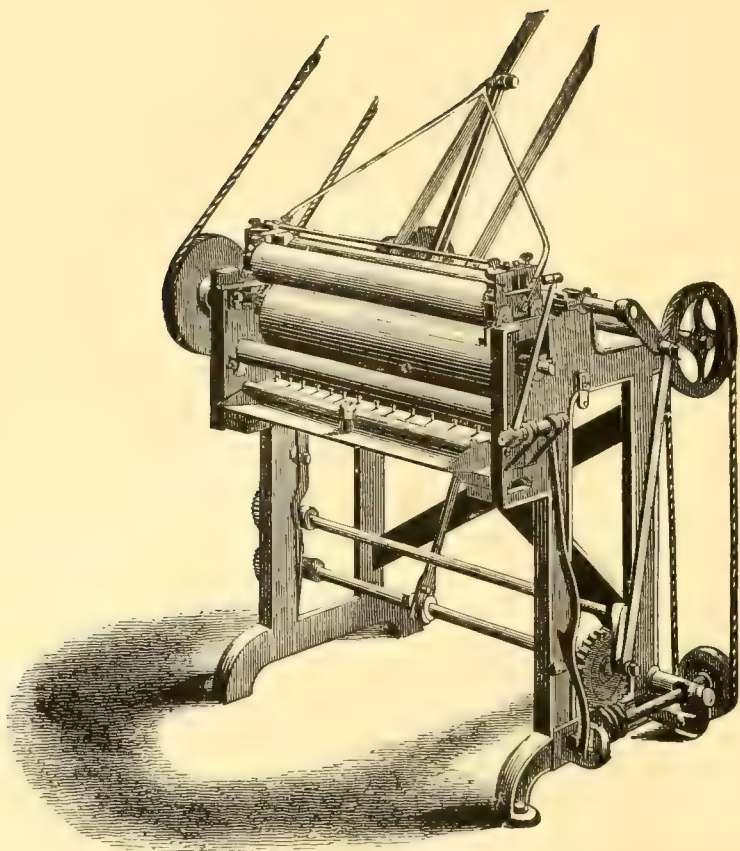
About 15 years since, Mr. Geo. Bruce, Jr., of New York, invented a very beautiful machine for casting type, and it is the best in the world. The patent has been renewed at the last session of Congress for seven years, and the right, title, and interest, have been purchased by Messrs. J. Conner & Sons. By this machine a man can cast three times as much in a day as by the old plan. The wages are less than half, per thousand, what they were before, but the caster, nevertheless, earns more. In these machines the type metal—which is a mixture of lead, tin, and antimony—is contained in a state of fusion in a small iron reservoir, about 5 inches square, and into which it is forced with great power. This is tapped by a nipple, which holds as much melted metal as will cast a type. The mould is of steel, in a small machine which is worked by a crank. It is simply for the body of the type, and is so placed that the lower end, by a movement of the machine, will fit exactly over the orifice of the nipple. Against the other end is applied a copper matrix of the letter, and firmly held by a spring. The operator then causes the metal to jet into the mould. Then, as soon as it is "set," he releases it, opens the mould, and allows the type to drop into a box. In this process, the matrix of the letter is separated from the body of the type. It is formed on a steel die, and impressed into the copper previously prepared,



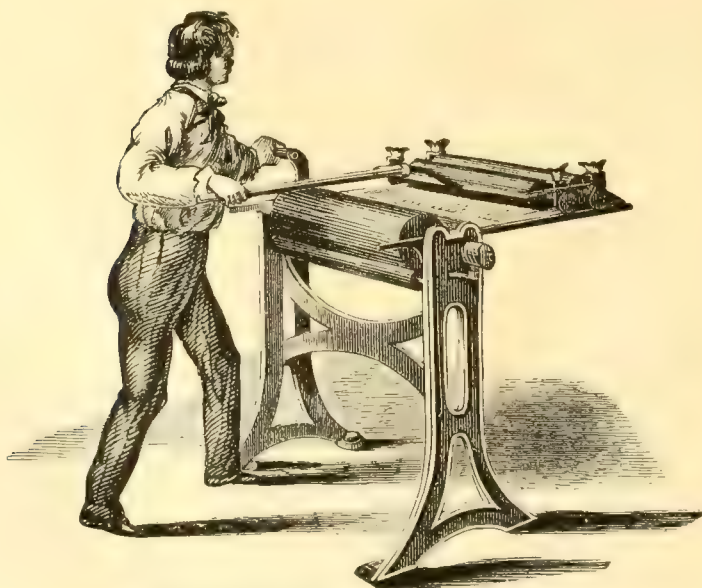
FRANKLIN PRESS.



PATENT WASHINGTON PRINTING PRESS.

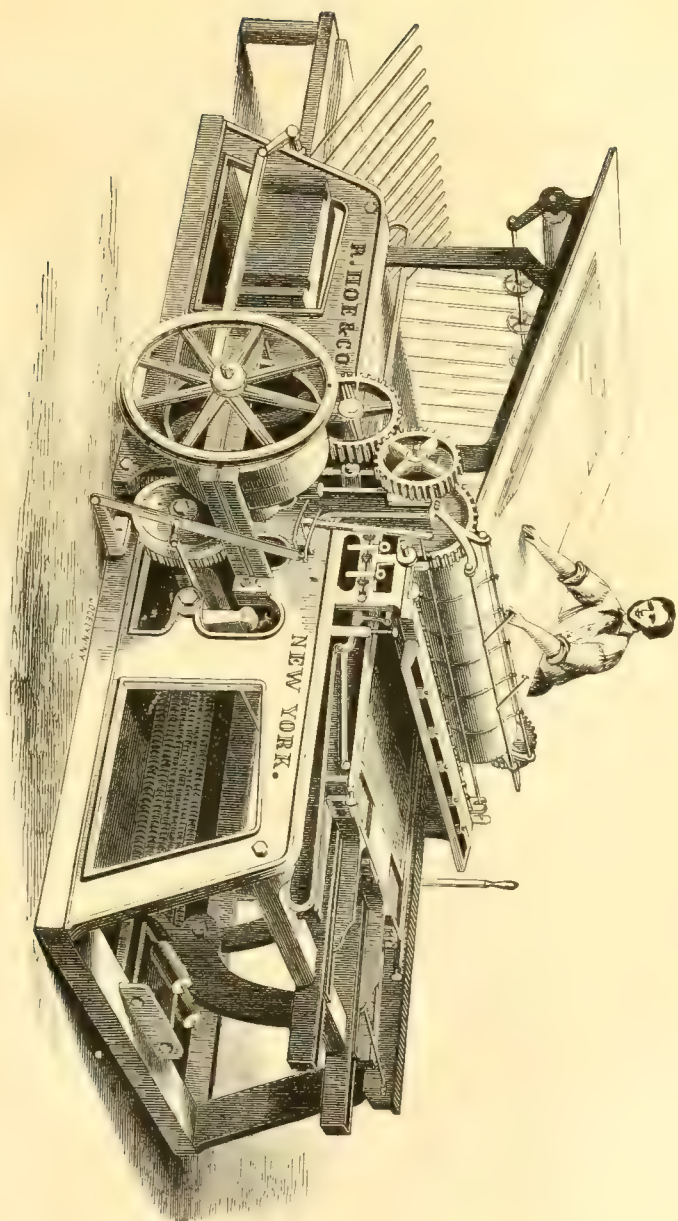


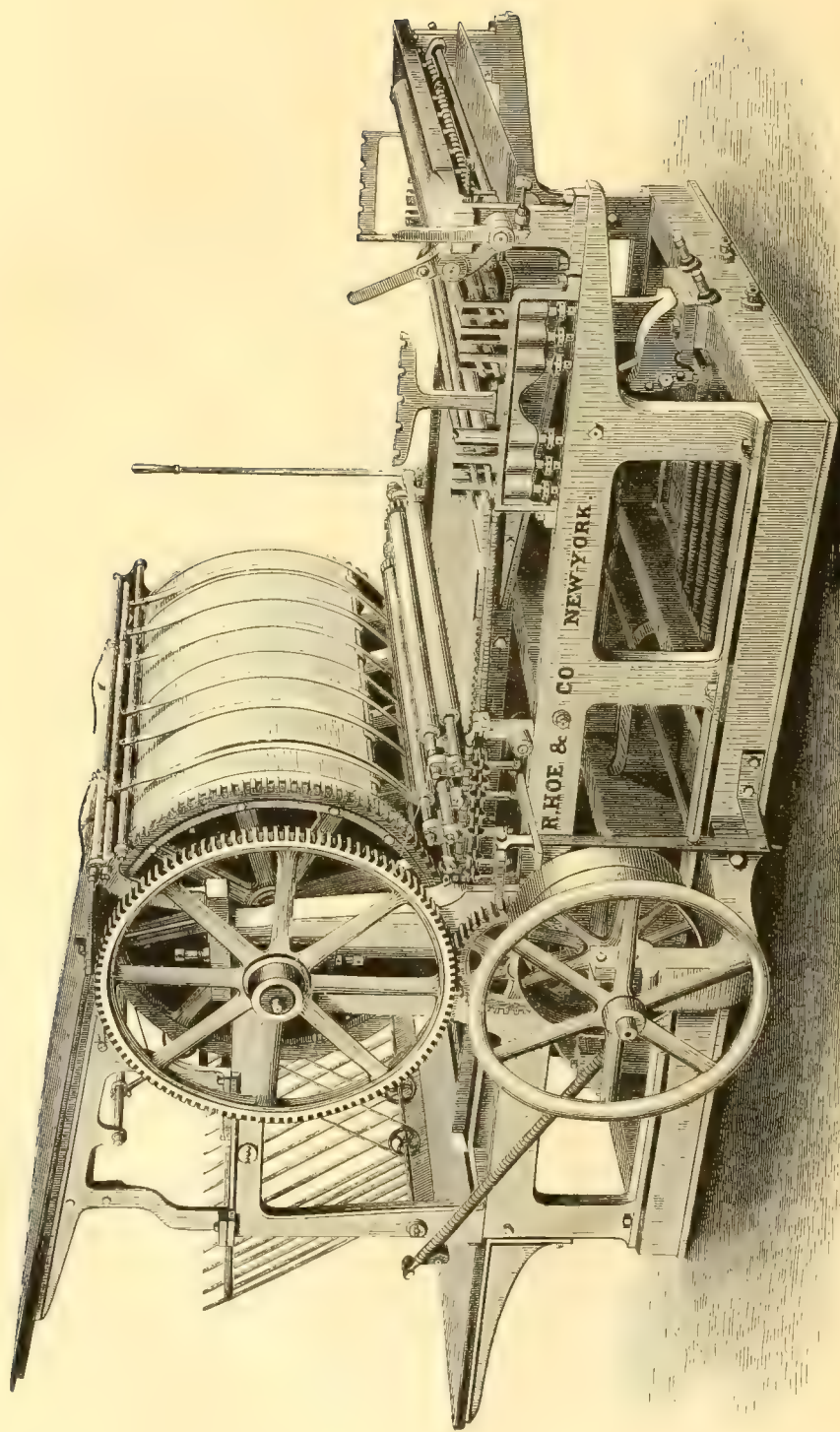
PATENT HAND-PRESS STEAM INKING MACHINE.



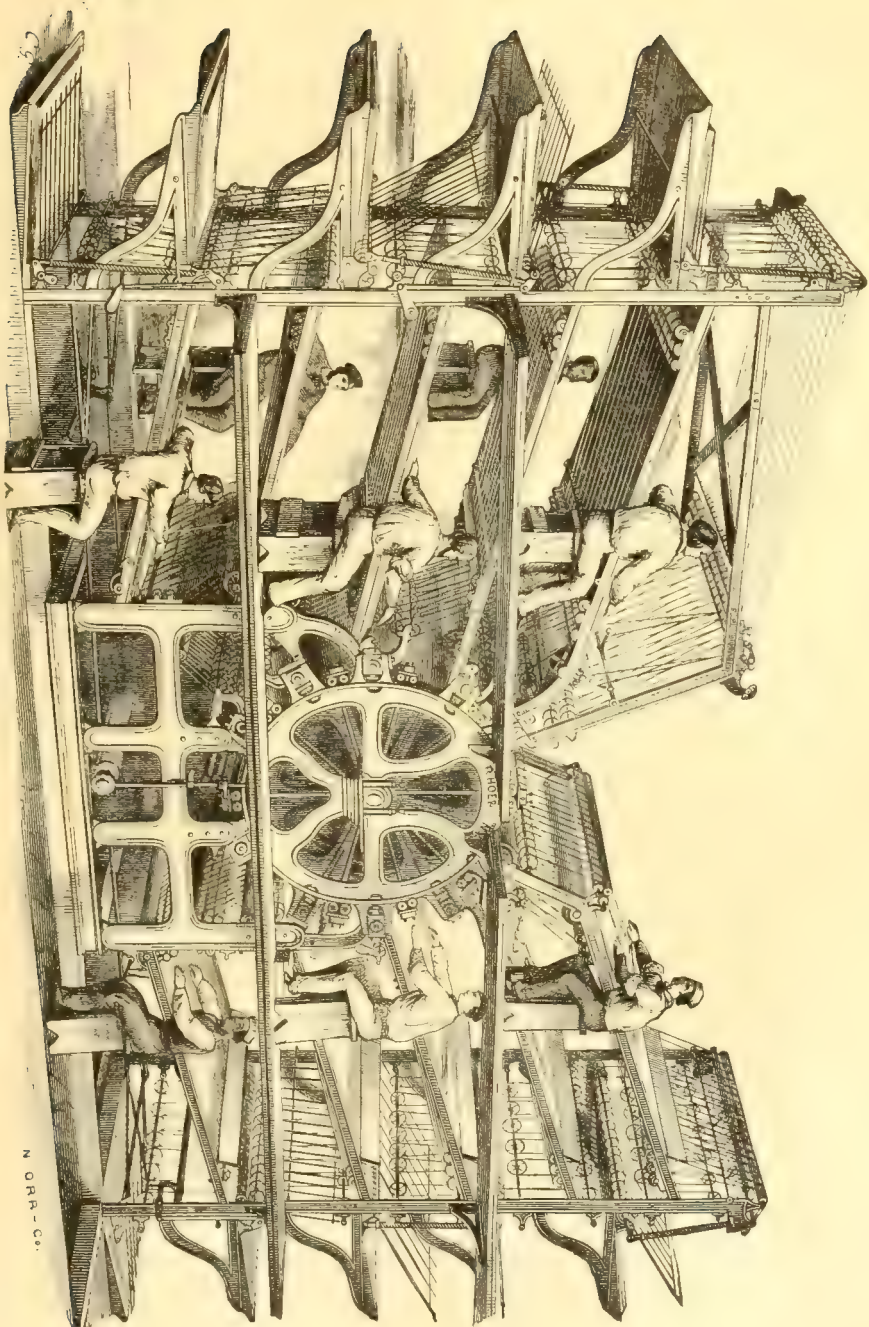
IMPROVED INKING APPARATUS FOR THE HAND-PRESS

PATENT SINGLE SMALL CYLINDER PRINTING MACHINE.



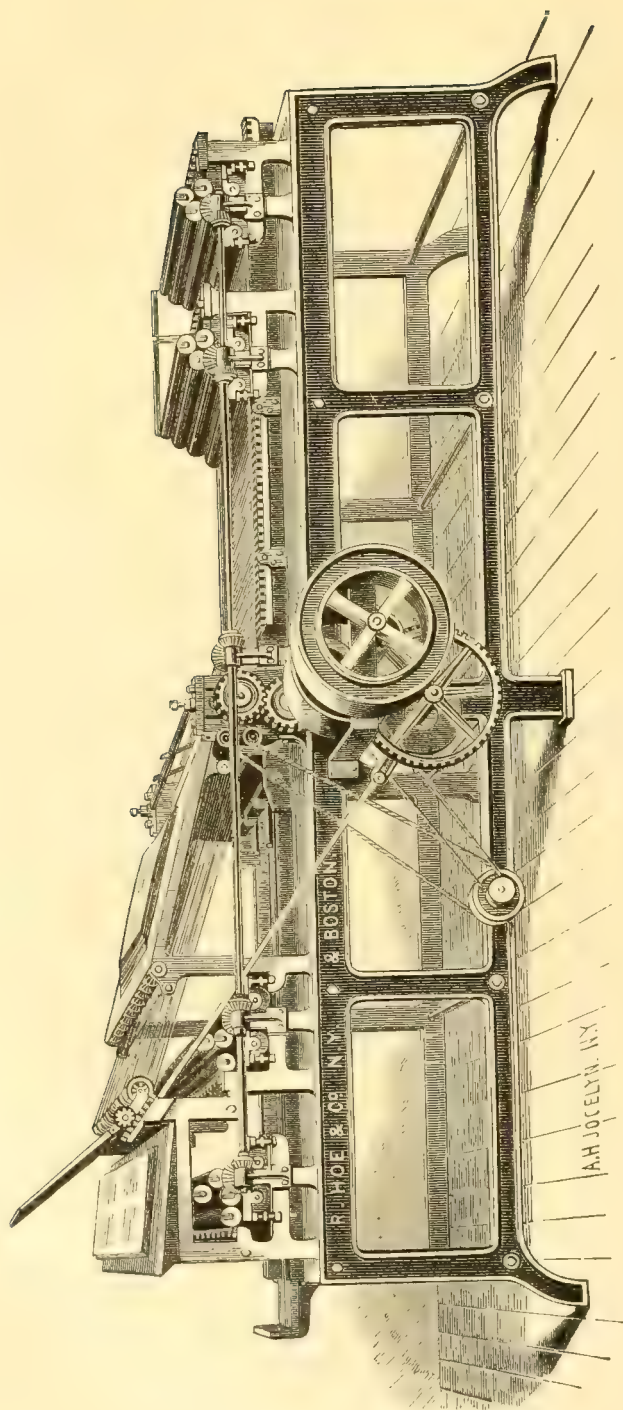


SINGLE LARGE PRINTING MACHINE.



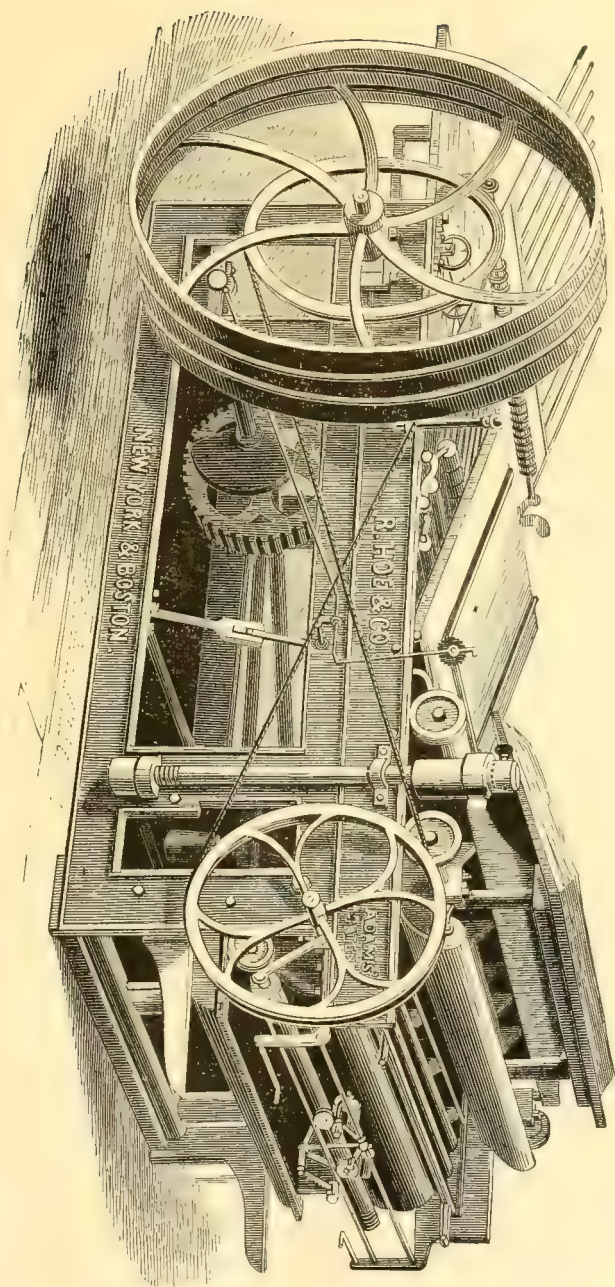
TEN CYLINDER TYPE-REVOLVING PRINTING MACHINE.

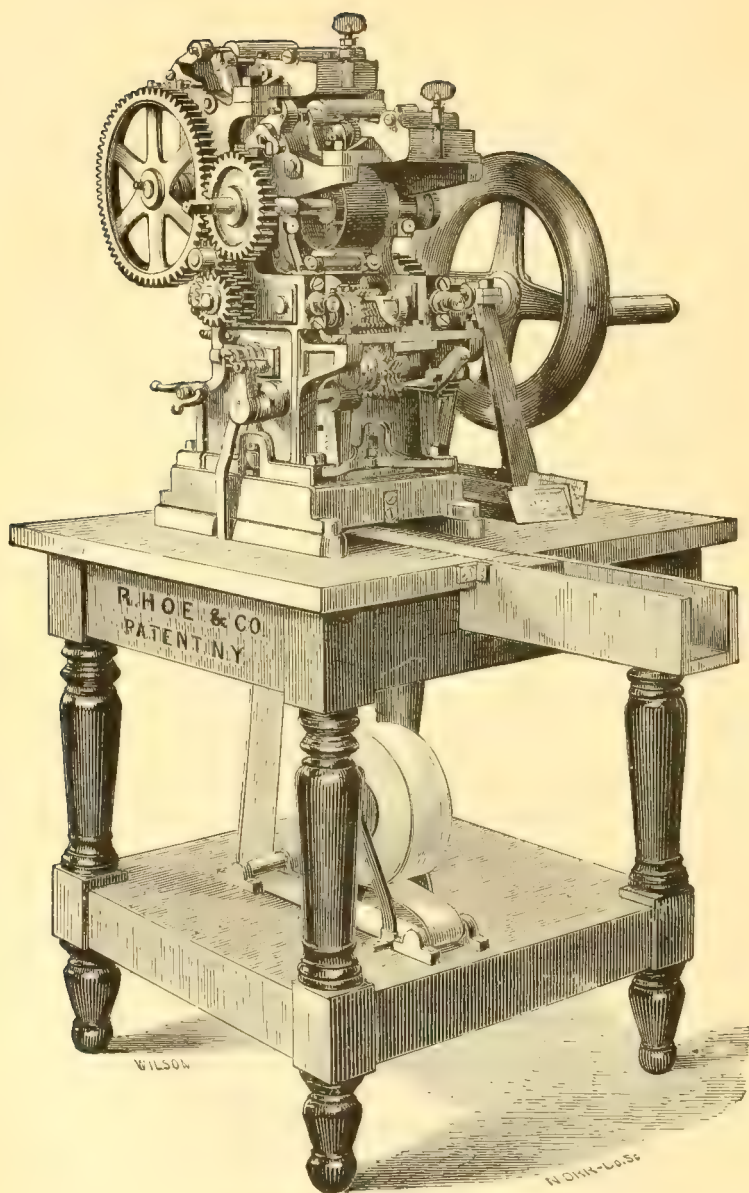
NORRIS & CO.



FOUR COLOR PRINTING MACHINE.

BED AND PLATEN POWER PRINTING MACHINE.





PATENT RAILROAD TICKET MACHINE.

In this machine the forms are placed on a cylinder which enables it to run with a continuous rotary movement. The tickets are worked from a roll of paper, and are printed, numbered, cut, and deposited in a receptacle in numerical order in a single operation. The numbering apparatus prints the number in a different color from the body of the ticket, and can be set at 0 or any required number with great facility. The machine will print from 10,000 to 12,000 tickets per hour, and occupies a space of about two feet square.

with great force. The adjustment of this matrix to the mould is a work of great care and nicety. After the type is cast, by whatever process—whether by machinery or the ancient spoon method—it has to undergo a smoothing operation. This is performed by young people, principally girls; three or four sitting around tables surmounted with properly prepared stone slabs, and by the fingers rubbing the roughness off each individual type. At this work they earn from \$5 to \$7 per week. The type goes then into the hands of the dresser. He cuts out what is called the jet end, by which process all the types are made of the exact height. On the nicety of this operation depends the ability to use the type. It may be here remarked that American type comes nearly always perfect into the hands of the dresser, while in England nearly one-fourth is rejected as imperfect.

The types have upon one side a "nick." As the types are perfected, a boy sets them on a "galley," with all the nicks out. They are then assorted into small "fonts," and are then ready for the printer. The proportions in which the different letters are cast to a font of type, and in which they occur in print, are as follows: Letter e, 1500; t, 900; a, 850; n, o, s, i, 800; h, 640; r, 620; d, 440; l, 400; u, 340; c, m, 300; f, 250; w, y, 200; g, p, 170; b, 160; v, 120; k, 80; q, 50; j, x, 40; z, 20. Besides these, are the combined letters: fi, 50; ff, 40; fl, 20; fh, 15; fh, 10; æ, 10; œ, 5. The proportion for capitals and small capitals differs from the small letters. In those, I takes the first place, then T, then A and E, etc. The "cases" in which the types are put for use, are arranged in the manner seen in the engraving on another page. The little square boxes in which the type is laid are not arranged in the regular order of the alphabet, but in the order which experience has shown is the most convenient for the compositor. Those letters which occur the oftenest—as e, for instance—occupy the largest squares nearest his hand, and the others in the order of their relative importance; the capitals, small capitals, and marks, each in its proper place, in the upper case. The workman does not look at the type. He reads his copy only, and that frequently tasks his ingenuity to make out. He knows the types from the boxes they occupy, and the "nick" enables him to place them right side up by sense of feeling only. He is paid by the thousand

ems when working by the piece. An em is about the space of a letter M, and 2,200 ems go to one of the pages of this book. A good workman will set 5,000 to 6,000 ems in a day. Sometimes they are paid by the week, \$12 per week, which is about the amount that an expert workman will earn by the thousand. The type he places in a small iron frame, held in his left hand, and called a "stick," which is adjusted to the breadth of the column or page. When this is full, it is deposited on a "galley," in a long column. From this galley a proof impression is taken to be read by the author and proof-reader. The inaccuracies are marked on this, and when corrected in the type, the foreman "makes up his form." If for a daily paper, this is done by screwing the columns into the "turtle," which is fastened upon the revolving cylinder of the press. When the type has been printed from or worked off, it is immediately washed in a strong alkali, to clear it from the ink. If this is not done thoroughly, it will not print clear. Formerly this washing was done with urine, but of late an alkali is substituted. The clean type has now to be "distributed," or put back into the cases. For this purpose the compositor takes the "matter" in his left hand, reads a line, and drops each letter into its appropriate place. This occupies a good deal of time.

Most of this type setting and distributing is still done by hand up to the present time, although the greatest efforts have been made to introduce machinery. A number of type-setting machines have been invented, and many of them work well in the setting of the type—the operator working upon keys, like those of a piano, with the copy before him. The arrangement is such that, by touching the proper key, the appropriate letter falls into line, and the work goes on rapidly and well, even to the punctuation. The difficulty not yet overcome, and which is an obstacle to its usefulness, is that no means of "justifying" have been discovered—that is, of breaking the lines into the suitable length, and "spacing" them out so that each line shall have the exact length of all the rest. This is done by the hand compositor, with great nicety, in his iron stick, as his work progresses. As this must still be done by hand, after the machine has set up the type, no great advantage is derived from its action. In type distributing more success has been obtained. The ma-

chine is so constructed that it will distribute 12,000 ems per hour with unerring accuracy, and one man may tend three machines; hence he will distribute, by its aid, 36,000 ems per hour, while a good workman by hand will only distribute 3,000 ems. This seems very desirable, but a new difficulty presents itself. The machine cannot read, so as to distinguish one letter from another, and it is guided in its selection by the "nicks." It follows, that no two of the twenty-four letters of the alphabet should have the same "nicks;" consequently, a special kind of type must be cast for the machine. They are then put into it in a mass, and present themselves alternately until the proper "nick" goes through. The advantages of the machine do not overcome its disadvantages.

In book work the type is not hurried from the compositor to the pressman, as in the case of the daily papers. There is more time, and the type itself is, therefore, not usually printed from, but it is stereotyped. This was introduced in America about the year 1817, by Mr. G. Bruce, the father of the inventor of the type-casting machine.

In this process, the type being locked up in the form, which usually contains 2 to 6 pages, and carefully revised and corrected, is sent to the stereotyper.

Stereotyping is the mode of casting perfect fac-similes, in metal, of the face of movable types. The plan is simple. After arranging the type in pages, and getting it perfectly smooth and clean, it is placed in a frame, the surface being thoroughly oiled, to prevent the mould from adhering, when liquid gypsum, or plaster-of-Paris, is poured over the page. The mould, thus taken, if found perfect, is dressed with a sharp instrument, and is then ready to receive the metal. It is then put into an iron casting-box, and the whole immersed in liquid type metal. Twenty to thirty minutes usually suffice for casting. The box is then swung out of the molten mass into a cooling-trough, in which the under side is exposed to the water. When hard, the caster breaks off the superfluous metal, and separates the plaster mould from the plate. It is then picked, the edges trimmed, the back shaved to a proper thickness, and made ready for the press.

The process of electrotyping has, of late, become an important element, and is in many cases preferred to the old system of stereo-

typing. It results from the disposition of copper, held in solution, to deposit itself on a metal surface, when under the influence of magnetism.

Stereotyping by the Electrotpe process is conducted as follows: An impression is taken from the corrected forms or engraved block upon a plate of wax, and finely pulverized plumbago is then dusted thinly over the surface of the wax. The excess is blown away in a machine contrived for this purpose, and the fine dust remains uniformly in contact with the wax in every little depression and line, without filling these up. The object of the plumbago is to act as the conducting medium for the galvanic current, until a film of copper is deposited. But by a recent modification of the process, this film is also produced before the article is put into the trough, by the application of a wash of sulphate of copper, (solution of blue vitriol,) and dusting over it fine iron filings. The solution is decomposed by the iron, and metallic copper is immediately precipitated, forming a delicate film which uniformly covers the whole surface. The wax plate retaining this film is well washed, and is then ready for the galvanic trough. In this it is left over night under the influence of the electric current, and in the morning when taken out, the coating of copper is found to be sufficiently thick for handling. The wax is removed, and the copper sheet, first tinned on the back, is placed face down in an apparatus in which it is covered with melted type metal. Thus backed a plate is obtained, which, after being dressed by planing and squaring, is screwed down upon a mahogany block, the height of the whole being the same as that of type.

Plates for use upon the cylinders of printing machines are made with the curve of the cylinders, the forms themselves in which the type are paged having a convex surface, which gives them the name of "turtles."

In making copper faced type, ordinary types are set in a frame so arranged as to let only the letter end in the copper solution of the battery. The deposit of copper adheres to this end, which it completely covers. Such type are now extensively used in large establishments, and are very durable.

Within the past twelve years, several processes have been invented, for copying printed books, steel and wood engravings, maps, etc., by photography upon stone or hardened wax or metallic surfaces and by etching, or

the use of acids, transforming these copies into matrices from which plates could be cast analogous to stereotype or electrototype plates. These processes, of which Osborne's Photolithographic, the Heliotype, the Albertype, and Jewett's and Morse's Cerographic processes are those best known, have reached various stages of perfection, but are undoubt-

edly destined to be of great service in some departments of the printing art. One of the finest specimens of this kind of work, was the fac-simile edition of Albert Durer's "Little Passion," copied from William C. Prime, Esq., by Mr. Julius Bien, a New York Artist."

NEWSPAPERS.

CHAPTER I.

NEWSPAPERS—DAILIES—WEEKLIES—PERIODICALS.

THE power and circulation of the daily press are among the marvels of the present day, and they are features peculiarly American. No country presents such a number of news publications, and none such a universal popular demand for them. This result has been obtained mostly in the last twenty-five years, by a combination of causes. The two leading ones, are the introduction of the cheap press and the invention of the means of so multiplying numbers, that much interesting matter can be sold for a little money. Take a leading morning daily. This is equal to a book of more than 100 solid octavo pages, sold to the retailer for one and a half cents every morning, no profit being derived from the sale. This has become possible only through the ability to produce a vast number on one hand, and through the immense receipts for advertising on the other. By the introduction of a cheap press, is not to be understood the mere printing of a mass of matter for a small price, but the introduction of such matter as attracts the attention of persons not previously habitual readers, and exciting in them so strong an interest as to make papers for the future a necessity. It is this which has been done by the cheap press.

The first newspapers of the country were hardly worth the name. In the colonies there was little of interest to draw public attention, and such papers as the *Spectator* and *Tattler* came across the water to meet the literary taste of the more wealthy, while the jealous care of the mother country watched over the colonial papers, lest they

should breed sedition. Dr. Franklin informs us that the first start he got in life was through the misfortune of his brother, who owned the paper on which he was an apprentice, in incurring the displeasure of the government for disrespectful remarks. The paper was suspended, as Paris papers are at the present day, and Benjamin's indentures were cancelled in order that he might become the nominal owner. The editor of the *Boston Courant*, in 1732, made his valedictory to the public, because he found it too vexatious to be running with his proof in his pocket to the government house, and the new editor promised to do the best he could under the circumstances. There were few subjects then to interest the general reader, and the restricted state of industry allowed but little range for advertising. The paper was poor, and mostly imported at a high price from England, while the laborious work of a man through the live-long night on the presses of the day, gave but a few hundred to circulate in the morning, and these few were to be sold at a rate that must cover all the expenses—that is to say, for more than they were worth.

The first daily paper published in the United States, was the *Pennsylvania Packet or General Advertiser*, started as a weekly, by John Dunlap, in 1771, and merged into a daily in 1784, at the peace. To one of the conductors of the paper, Washington gave the manuscript of his "Farewell Address," and which, at a sale made in 1855, was purchased by Mr. Lennox, of New York, for \$2,000. The first form in which printed news appeared in England was that of doggerel ballads, which were issued as early as the reign of Queen Mary. These were followed by occasional sheets, or pamphlets, of

news; but the first approach to a regular newspaper was the *Weekly Newes from Italy, Germanie, &c.*, May 23, 1622, which was continued, with some variations of title and occasional intermissions, until 1640. The earliest specimen of parliamentary reporting is entitled, *The Diurnal Occurrences or Daily Proceedings of Both Houses in this Great and Happy Parliament, from 3d November, 1640, to 3d November, 1641*. More than one hundred newspapers, with different titles, appear to have been published between this date and the death of Charles I., and upward of eighty others between that event and the Restoration. Occasional papers were issued after the civil war began, limited to local or special occurrences, as *News from Hull*, *Truths from York*, *Tidings from Ireland*. The more regular newspapers were published weekly at first, then twice or thrice in a week. The impatience of the people soon led to the publication of daily papers; and Spalding, the Aberdeen annalist, mentions that in December, 1642, daily papers came from London, called *Diurnal Occurrences*, declaring what was done in Parliament. In the Scottish campaign of 1650, the army of Charles and that of Oliver Cromwell each carried its printer along with it to report progress, and, of course, to exaggerate successes. It is from this circumstance that the first introduction of newspapers into Scotland has been attributed to Oliver Cromwell.

The stirring events of the American Revolution in like manner gave a great impulse to printing; but that took the form of pamphlets and circulars more than that of the periodical press. The event made the press free, and it began a new career; but the habits of the people had not been overcome, nor were the means of popularizing the press yet in existence. Nevertheless, politics became the staple of newspapers, which were started in most sections as the organs of parties and to support candidates for office; as a matter of course these were read mostly by those who were of the same way of thinking. The circulation could never reach a point that would make it profitable of itself, because the limit was the power of the press to work the papers. In the great cities the chief support of the press was the advertising patronage, bestowed in some degree in the light of political support. The foreign news and domestic items of intelligence made up the general interests, with ship news, that began after the war of 1812 to have a more extended char-

acter. These papers, published at \$10 per annum, did not much interest the mass of people, beyond whose reach the price for the most part placed them; advertising patronage and government "pap" were therefore the sources looked to for profit. These papers were seldom left in families, but were carried home by those who took them at their places of business. The papers of the early part of the century were very meagre. The oldest existing papers of New York are the *Commercial Advertiser*, founded in 1797, and the *Evening Post*, in 1801. The rivalry among the papers of the day was not so much to interest the general reading public, as to conciliate those commercial interests on the patronage of which the means of the paper mostly depended. The *Commercial Gazette*, of New York, became a leading journal through the enterprise of its editor in collecting ship news. He himself rowed a boat, boarding vessels coming up the bay, to collect reports with which he enriched his columns. Other papers soon followed his example. In 1827, the *New York Journal of Commerce* was started, chiefly by Arthur Tappan, Esq., of Boston, and David Hale, then an auctioneer in Boston, was made joint editor with Mr. Hallock, of New Haven. About the same time, two papers were united in the *New York Courier and Enquirer*, under James Watson Webb. These two papers employed news schooners to furnish ship news at great expense. This enterprise was promoted by the introduction of a Napier press, which allowed of an increased circulation of larger sized papers, and these became filled with advertising as the speculative years that exploded with 1837 came on. The success of these two rival papers, was fatal to the other old papers. The *Mercantile Advertiser*, by Butler; the *Daily Advertiser*, by Dwight and Townsend, and the *Commercial Gazette*, by Lang, which had long flourished, died out. Several other papers followed, among which was the *New York American*, an evening paper, edited by Chas. King, Esq. At that period cheap newspapers, fast presses, telegraph and express companies made their appearance all together, to work out by mutual aid the marvels that we have since witnessed. The first penny paper was published by Benjamin H. Day, in 1833. It was about ten inches square, and sold for one cent, or to newsboys for sixty-two and a half cents per hundred. It was without editorials, but was

filled with news items. It grew rapidly to a large circulation, and acquiring advertisements, swelled into a larger sheet, which got into the hands of Mr. Beach. Mr. M. Y. Beach and his son, Mr. M. S. Beach, conducted it almost entirely as a local paper, with no particular political character, but with a very large circulation (60,000 to 70,000) up to 1867. Mr. M. Y. Beach was famous for having "many irons in the fire" at the same time, and besides the *Sun*, had a manufactory, two banks, and sundry other enterprises on foot. During and after the war, the circulation of the *Sun* had decreased, (its price being advanced to two cents as that of the other morning papers had been to four) and in 1867 it had only about 48,000 purchasers. A company of capitalists and literary men, among whom were Mr. Chas. A. Dana, previously of the *New York Tribune* and the *Chicago Republican*, Mr. M. S. Beach, Mr. Hitchcock, formerly of the *New Jerusalem Messenger*, Mr. I. W. England, and others, in 1867 purchased the *Sun* and the old Tammany Hotel, and fitting up the latter in fine style, removed the paper to its new quarters, and very greatly changed its character. Its circulation fell off to 35,000, and then began to rise till it exceeded one hundred thousand, and has maintained itself at about that point for more than a year past. It has now a large editorial corps, and in all its appointments is perhaps the most complete newspaper office in the world. In our illustrations we have presented some of the appliances by means of which the edition of a hundred thousand copies, admirably printed, are flung off, in the space of a little more than three hours each morning.

But to return to our history of newspapers. In 1835, James Gordon Bennett, previously one of the editorial staff of the *Courier and Enquirer*, started the *New York Herald*, on a capital of \$500, but with a most indomitable energy. His first week's expenses were \$56. At the end of thirty seven years they are from \$20,000 to \$30,000 per week. The price of the paper at first was one cent per copy. It was advanced soon to two cents, and during the war to four, at which price it has since remained. The circulation of the paper increased rapidly but steadily, till it reached 70,000 to 80,000 copies, occasionally going even higher than this. The sheet has been repeatedly enlarged, and is

now a very large double sheet with frequent supplements, making it triple or quadruple. It has never had any great political influence, its aim being to keep on the popular side, whichever that might be, and its editorial columns have not indicated any remarkable ability; but it has been very enterprising in its market and financial reports, its vast and varied correspondence from all parts of the world, and its very full and generally accurate reports of public meetings of all sorts, speeches, lectures, addresses, and sermons, have been features which have ensured it a great circulation. It would have been impossible, however, for it to have attained this, had not the improvements in printing machines made it possible to multiply copies at the rate of 25,000 to 30,000 per hour. Soon after the war commenced, the *Herald*, followed speedily by the other morning papers, resorted to the plan of stereotyping the pages of its daily issue, in order to multiply them more easily. This could not have been done by the old stereotyping process with sufficient rapidity to be of any service, but a method of stereotyping by means of *papier mache*, or a material analogous to it, then just invented, was rapid enough to answer all purposes, and with this and Hoe's ten cylinder printing machine, the proprietor of the *Herald* could print fast enough for his daily edition. Mr. Bennett died June 1, 1872.

The *New York Tribune* was issued for the first time in 1841. Horace Greeley, its editor and first proprietor had come to New York in 1831 as a printer, and had developed remarkable talent as an editor, and political writer. He had projected several papers, some of them campaign papers of very large circulation; for three or four years previous he had been editing the *New Yorker*, a very good but not a profitable paper. He started the *Tribune* with \$1,000, mostly borrowed money. In the thirty-one years since that time, the paper has become a great power in the nation. It has always been edited with ability, and has been for about half that time owned by a joint stock association, but Mr. Greeley has been its chief editor and master spirit. Always an active politician, first a Whig and afterwards a Republican, he has made it from first to last a political paper; and though at times differing decidedly in opinion from his associates in the party, its editor has always been recognized as one of its most valued leaders.

He has recently (in May, 1872) been nominated for the Presidency by a convention held at Cincinnati, and the nomination advocated by prominent men of both political parties, and has in consequence withdrawn for the present from the editorial management of his paper. The circulation of the *Daily Tribune* is not so large as that of the *Sun* or the *Herald*, though greater than that of any other morning paper; but the circulation of the *Weekly Tribune* is vastly greater than that of any other political weekly in the United States—reaching in some years 225,000 copies weekly. A semi-weekly edition is also printed.

The *New York Times* was founded in 1850, by Henry J. Raymond, who had previously been a writer on the staff of the *Tribune* and the *Courier and Enquirer*. It was some time in attaining to a profitable success, but for eighteen or nineteen years past has been one of the leading dailies of New York City. During Mr. Raymond's life time it was edited with marked ability, but since his death in 1869, has hardly maintained its old reputation.

The *World*, founded in 1860, by an Association with a large capital, as a Republican and religious daily paper, met with several changes in the course of the next two years, and in 1862 became a Democratic paper, in which faith it has since continued. It is very ably edited and has a circulation nearly as large as that of the *Times*—about 35,000 of its daily edition.

Of the later ventures in the way of morning papers, in New York City, only the *Star* has achieved any considerable success. It has taken rank with the older dailies, though it would be difficult to say why it should have done so.

Several of the low priced evening papers have been successful. The *Telegram*, owned and controlled by the son of the proprietor of the *Herald*; the *News*, the *Witness*, a daily religious paper of decided ability, the *Express*, and the *Evening Mail* have each a circulation ranging from 10,000 to 25,000.

Of course none of these papers are supported by their subscription lists or their circulation. In the case of the larger sheets this would hardly suffice to pay for the paper on which they are printed, but these extended circulations make them very valuable as advertising mediums, and they derive so princely a revenue from their adver-

tisements, that in favorable years the net income from the *Herald* and the *Tribune* has reached \$200,000 or \$250,000 per annum, and that of the *Times* and the *World* has exceeded \$100,000 each. The *Staats Zeitung*, (*State Gazette*) a German daily paper, has a circulation inferior probably only to those of the *Herald* and *Sun*. The *Evening Post*, *Commercial Advertiser*, etc., though printed as folios, and not as quarto sheets, have a very large advertising patronage, mostly from the shipping and wholesale merchants, book publishers, etc. The advertisements in the morning papers are, to a large extent, fresh advertisements daily, received and paid for the previous day. Those of the evening papers are, many of them, less frequently changed. The advertisements of the morning papers belong to the day on which they appear, and compose a part of the life and the news thereof, like any other matter in the paper—to many people more interesting and more important. No portion of a great metropolitan journal, then, is dead matter; even the advertising columns, which many suppose to be dull and tedious, are full of life and interest, and fresh every day. It is amusing to contrast such a paper with the *Philadelphia Gazette* of 1750, then conducted by Benjamin Franklin. Its dimensions are about eight by ten. The news and reading matter which it contains, could all be put into one of the pages of this book. *It has not a single line of editorial*. Its latest foreign news was about three or four months old. Its domestic news principally related to the Indians. Among its advertisements were several notices of the sale of negroes in Pennsylvania. The progress of the newspaper art is well illustrated by comparing this sheet with those issued in our large cities at the present day.

At first the extension of this circulation of the city newspapers was greatly facilitated by the expresses which received the packages as they came from the press for the larger towns and cities, and hurried them out to the dealers. But very soon there was found a necessity of an intermediate agency which could make for itself a vast business while at the same time it saved expense to the dealers in other cities, towns and villages, and the news companies came into existence. There had been several houses each with its considerable circle of customers, which dispatched to their several customers a daily,

tri-weekly, or semi-weekly package of the literary papers and periodicals, together with such looks and stationery as might be sent in to them to pack. Most of these dealers in New York City united and formed the American News Company, which soon supplied its customers with all that they required from its own vast stock, and giving its orders daily for such quantities of the daily papers as it required for its customers, hurried these to its broad shelves, packed them with the other goods ordered, and sent them in quantities of ten or many tons by the morning trains and expresses, with all of which it had arrangements, to its thousands of customers in all directions. Its business grew till it took from 250,000 to 300,000 copies of Bonner's *Ledger* and half as many of some of the other popular literary and illustrated papers, 30,000 or 40,000 copies of the *Independent*, and enormous quantities of the Sunday papers, whole editions of popular books and pamphlets, 90,000 or 100,000 of *Harper's Monthly*, etc., etc. In process of time, other news companies were organized in New York, and a gigantic one at Chicago, and the business was divided to some extent, but the American News Co. has still a vast business. An attempt was made a few years ago to furnish the New York morning papers at the breakfast hour to all customers on railroad routes within a radius of two hundred miles or more around the city. This was accomplished by arranging a special express train to start out on each road at about two o'clock each morning, taking all the papers which were printed up to that time, driving with all speed to the railroad, throwing them on the train and making up the packages on board, throwing them out at each point to an agent as the train shot by, till the farthest limit of morning distribution was reached. The plan proved practicable, but too expensive to pay at first, and it was dropped.

The sale of papers at the steamboats and in the cars has become a large business, and the privilege of doing so is now farmed out by the companies. The privilege is paid for at rates sometimes as high as \$5,000 per annum on good routes, say some of the best traveled in New York. The dealer employs boys who start with the out trains in the morning, supplying all who go. These trains meet others, in an hour's ride, coming in, filled not only with passengers from a dis-

tance, but with persons who, doing business in the city, commute on the road, and come in every day; all of them are anxious for the papers, and they are sold at a large advance on the cost; the four cent papers usually at from five to ten cents; the seven cent papers at ten or twelve, and the two cent papers at three to five cents, thus yielding the vendor a handsome profit.

The Sunday press has become a feature in New York within twenty years. The first Sunday paper was the *Sunday Morning News*, published in 1835, by Samuel Jenks Smith. It had a considerable success, but stopped on the death of Mr. Smith. In 1840, the *Atlas* was started by Herrick, Ropes & West. The last-named had been a reporter on the *Herald*. The paper had a great success, and is still flourishing. The *Sunday Mercury* was next started, and received a great impulse from the "Patent Sermons" of Dow, jr. Then followed the *Sunday Times*, the *Dispatch*, and others, which have attained much success.

The circulation of the New York dailies is now (1872) more than 500,000 copies, against 10,000 in 1855. In 1865, there were 307 newspapers and periodicals published in the city of New York (673 in the state) of which 21 were dailies, with an aggregate circulation of 425,000 copies daily, 8 semi-weekly with a reported circulation of about 75,000; 223 weekly of which 42 had an aggregate circulation of 1,587,500; 11 semi-monthly and 118 monthly; 11 of the monthlies reported a circulation in the aggregate of 337,000. These returns are so incomplete as to be of very little value, and those of the census of 1870 which give the aggregate of the newspapers published in the state at 492,770,868 for the year are very far below the truth. It is certain that more than 375,000,000 newspapers are printed in New York City every year, aside from magazines, reviews, and quarterly periodicals.

The weekly papers are of several classes. Those devoted to light literature have the largest circulation. Bonner's *New York Ledger* leads in this class, maintaining a weekly circulation (mainly through the American News Co., and a large subscription list) of about 400,000 copies. *Street & Smith's Weekly* boasts of a circulation of about 300,000; *Harper's Illustrated Weekly* from 130,000 to 150,000, and *Harper's*

Bazar nearly 100,000; the *Mercury*, *Frank Leslie's Illustrated Paper*, the *Fireside Companion*, the *Chimney Corner*, and *Moore's Rural New Yorker*, range from 75,000 to 100,000, and the number of papers of this class, ranging from 40,000 to 70,000 is large.

The religious papers have also attained a large circulation within a few years past. The *Christian Union* now takes the lead with a circulation of about 100,000; the *Independent* comes next with nearly 75,000; while the *Observer*, *Examiner* and *Chronicle*, *Evangelist*, *Advocate*, *Metropolitan Record*, and *Methodist*, range between 25,000 and 50,000 each.

There are also several scientific and miscellaneous journals, such as the *Scientific American*, *Hearth and Home*, *Railroad Journal*, etc., etc., which have a large clientage ranging from 25,000 to 50,000.

In other cities there are also some instances of great success. The *Ledger* of Philadelphia has a daily circulation as large or larger than that of the *Sun*, but no other daily in that city exceeds 30,000. The *Saturday Night*, a weekly literary paper, has a circulation of over 200,000, but none of the other literary papers of that city exceed 100,000.

Of daily papers in other cities, the *Tribune* and the *Times*, both of Chicago, the *Journal*, the *Traveller* and the *Transcript* of Boston, the *Commercial*, the *Gazette*, the *Chronicle*, and the *Enquirer* of Cincinnati, the *Republican* and the *Democrat* of St. Louis, the *American* and the *Gazette* of Baltimore, the *Courier-Journal* of Louisville, and the *Republican* of Springfield, Mass., are those of largest circulation. Some of the political weeklies of other cities have a very large circulation. The *Toledo Blade*, Toledo, Ohio, has a circulation ranging from 80,000 to 100,000, and *Pomroy's Democrat*, before its removal to New York, had about 100,000. All the papers of large circulation which depend to any extent upon their subscription lists, use folding machines and directing machines which save a vast amount of hand labor.

The following statistics of American Journalism, drawn from the census of 1870, will interest all our readers. The whole number of newspapers and periodicals in the United States, is 5,845, to which are to be added 73 for the Territories, 353 more are printed in the Dominion of Canada, and 29 in the

other British Colonies, making a total for the United States and British America of 6,300 periodicals. Of those published in the United States, there are:

Daily,.....	574	Semi-monthly,.....	96
Tri-weekly,.....	107	Monthly,.....	621
Semi weekly,.....	115	Bi-monthly,.....	13
Weekly,.....	4,270	Quarterly,.....	49

Total,..... 5,845

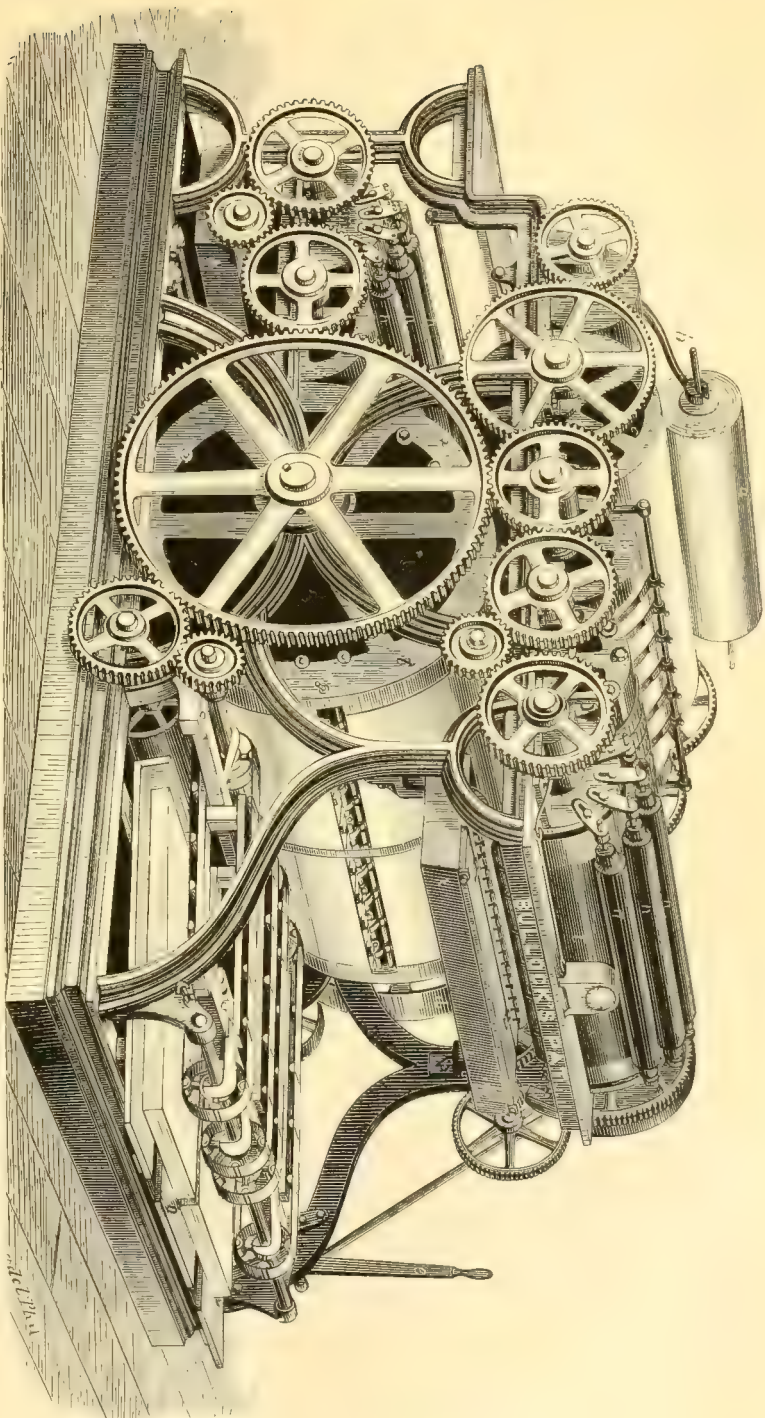
Of this immense aggregate, 79 papers, ranging from weekly to quarterly, are published only for advertising purposes. Subtracting these as not fairly to be counted among the publications which illustrate the journalistic enterprise of the nation, we have 5,766 newspapers and periodicals in the country—an average of one to about 6,500 of the population. The whole number is distributed among various interests as follows:

Political,.....	4,328
Agriculture and Horticulture,.....	93
Recreative and Secret Societies,.....	81
Commercial and Financial,.....	122
Illustrated, Literary, and Miscellaneous,.....	502
Specially devoted to Nationality,.....	80
Technical and Professional,.....	207
Religious,.....	407
Sporting,.....	6

The political papers are divided into 2,560 weekly, 552 daily, 101 tri-weekly, 100 semi-weekly, 8 semi-monthly, and 6 monthly. The religious papers are divided as follows: Weekly, 208; semi-monthly, 40; monthly, 141; bi-monthly, 1; quarterly, 17. There are three daily scientific or professional newspapers; the remainder, 204, range from weekly to quarterly, there being 130 monthly. The literary and illustrated papers run the entire gamut, from 8 daily to 7 quarterly, with 303 weekly and 157 monthly. There are 8 daily commercial or financial papers, 56 weekly and 40 monthly. Agricultural papers: weekly, 35; semi-monthly, 2; monthly, 56. Of the "sporting" papers, 5 are weekly and 1 monthly.

Turning to the vital question of circulation, we find the facts of special interest, and can best exhibit them, perhaps, by the following table, in which we give the number of each class with the aggregate and average circulation:

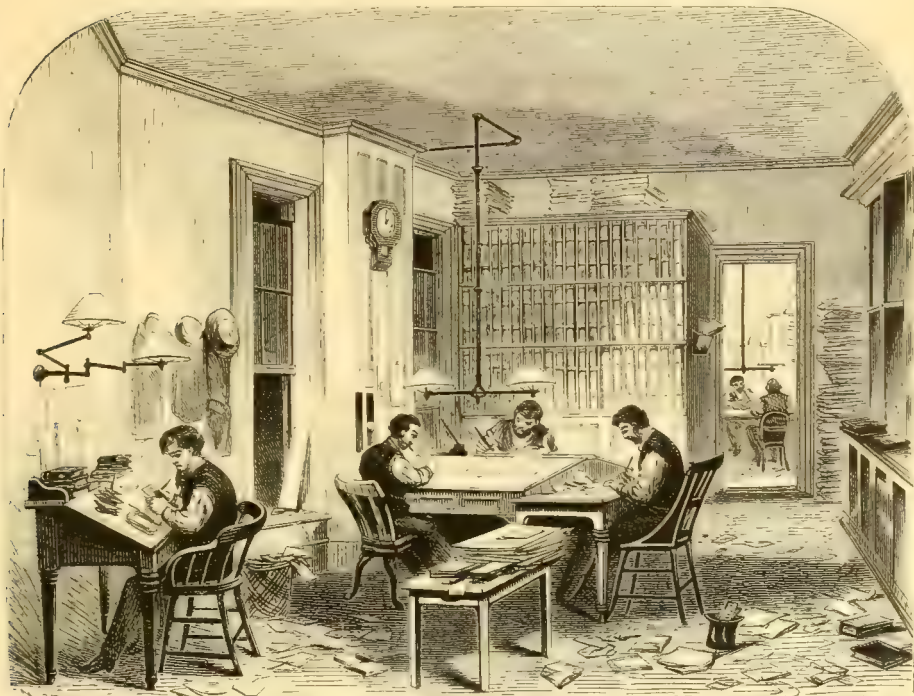
	No.	Circulation.	Average.
Political,.....	4,328	8,778,320	2,028
Agricultural,.....	93	710,752	8,072
Societies,.....	81	257,080	3,173
Financial,.....	122	690,200	5,657
Literary,.....	502	4,421,935	8,808
National,.....	80	45,150	2,257
Scientific or Professional,.....	207	741,581	3,596
Religious,.....	407	4,764,353	11,706
Sporting,.....	6	73,500	12,250



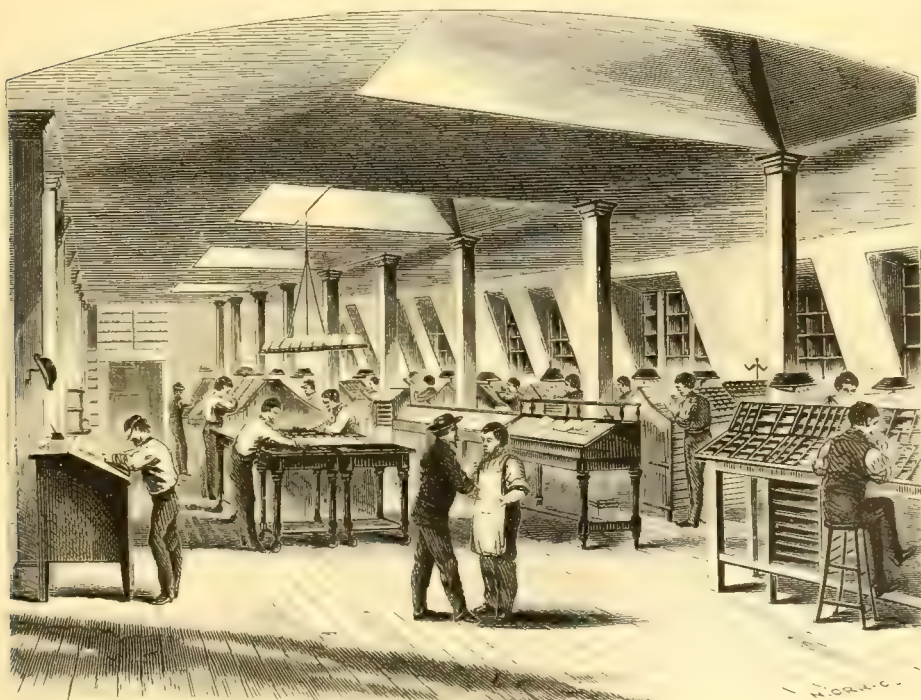
THE BULLOCK PRINTING PRESS

Prints from a continuous roll, as seen on top. Prints both sides of the paper in passing through cuts it off on leaving it—prints at the rate of 250 papers per minute—needs so little care, we may as well say it takes care of itself. It requires four presses to print the Daily N. Y. Sun.

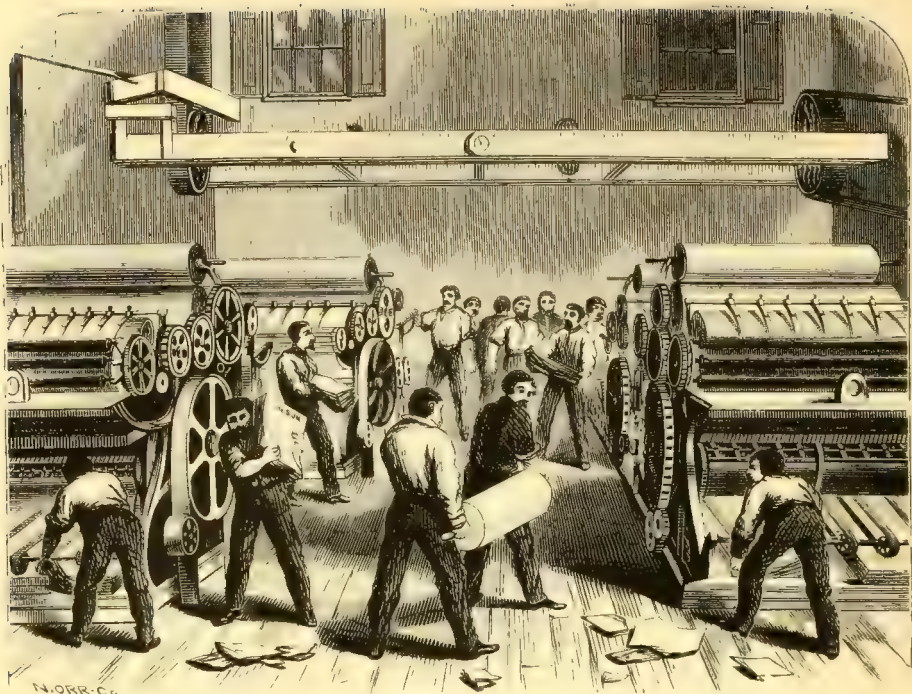
INTERIOR VIEW OF THE N. Y. SUN PRINTING ESTABLISHMENT.



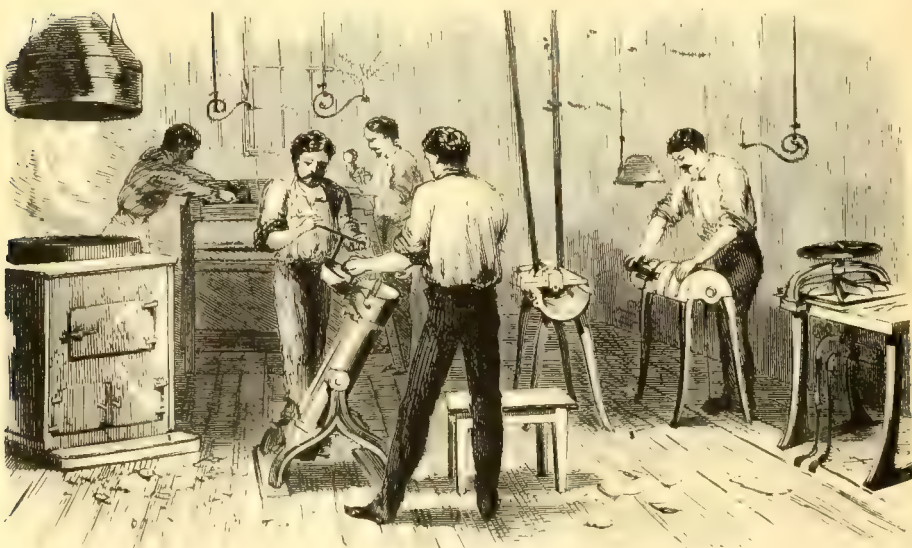
EDITORIAL ROOM.



COMPOSING ROOM—SETTING UP TYPE.



PRESS ROOM.



STEREOTYPING ROOM.

The aggregate circulation of daily papers in the United States is 2,606,547: average circulation, 4,541. The weekly papers circulate 10,591,743 copies, with an average of 2,080.

The total annual circulation of newspapers printed in the State of New York is 492,770,868 copies, being more than twice the number issued in any other State. The next greatest number of issues is in Pennsylvania, where 233,380,532 copies are annually printed. Massachusetts prints 107,691,952 copies, Illinois 102,686,204, Ohio, 93,592,-

448. Next comes California, with 45,869,-408 newspaper sheets per annum.

The following table shows the average circulation of newspapers and periodicals in each State and Territory, and the Colonies of British America; the total annual circulation, and the average number of copies printed yearly for each inhabitant. This is not a sure indication of the relative number of readers in each State, as the leading papers in large cities are largely circulated outside the State where printed:

States, Territories, &c.	Average Circulation.	Total Annual Circulation.	Average No. of copies printed yearly for each inhabitant.
Alabama,.....	1,970	8,891,432	5
Arkansas,.....	650	2,438,716	5
California,.....	1,846	45,869,408	82
Connecticut,.....	3,000	15,697,320	29
Delaware,.....	1,247	1,596,480	13
District of Columbia,.....	4,323	11,637,400	89
Florida,.....	616	841,880	5
Georgia,.....	1,270	14,447,388	12
Illinois,.....	2,907	102,586,204	41
Indiana,.....	1,490	28,515,862	17
Iowa,.....	1,013	19,344,636	16
Kansas,.....	1,828	12,465,768	35
Kentucky,.....	1,968	17,392,044	13
Louisiana,.....	1,220	14,628,028	20
Maine,.....	2,257	9,082,596	14
Maryland,.....	2,077	19,461,660	25
Massachusetts,.....	5,709	107,691,952	74
Michigan,.....	1,654	17,513,120	15
Minnesota,.....	1,121	2,811,120	7
Mississippi,.....	753	4,403,460	5
Missouri,.....	2,104	37,737,564	22
Nebraska,.....	913	3,147,100	27
Nevada,.....	516	1,714,960	40
New Hampshire,.....	2,194	5,711,720	18
New Jersey,.....	1,475	19,766,104	22
New York,.....	7,411	492,770,868	113
North Carolina,.....	814	4,220,676	4
Ohio,.....	3,154	93,592,448	35
Oregon,.....	1,352	3,658,304	40
Pennsylvania,.....	3,704	233,380,532	67
Rhode Island,.....	2,489	10,048,048	46
South Carolina,.....	1,354	5,804,136	8
Tennessee,.....	1,747	15,712,236	13
Texas,.....	701	5,813,432	7
Vermont,.....	2,528	4,486,914	14
Virginia,.....	1,107	13,790,788	12
West Virginia,.....	842	3,372,668	8
Wisconsin,.....	1,317	20,577,396	20
Territories.....	853	3,829,121	13
New Brunswick, Dominion of Canada,.....	1,750	3,961,808	12
Nova Scotia, Dominion of Canada,.....	1,334	3,818,784	10
Ontario, Dominion of Canada,.....	1,897	33,757,528	17
Quebec, Dominion of Canada,.....	1,409	21,812,560	16
British Colonies,.....	640	.....	.....
Total Average,.....	1,842	1,499,922,219	35

TELEGRAPHS—THEIR ORIGIN AND PROGRESS.

CHAPTER I.

TELEGRAPHS—THEIR ORIGIN AND PROGRESS.

"Canst thou send lightnings that they may go, and say unto thee, 'Here we are'?"—*Job*.

THE invention and use of electric telegraphs are among the most important of modern improvements; and it is somewhat remarkable that the invention justifies the trite observation, that great inventions are made always at the moment they are wanted. Telegraphs have been used from the remotest antiquity, by signals of various kinds; and one by flags, to signal the arrival of vessels below, has been used during the present century in Boston; and, in New York, one operating by arms has been used for the same purpose from the Narrows to the roof of the Merchants' Exchange in New York. The electric telegraph applied lighting to intelligence as steam was applied to motion, and came into being to exceed, by its rapidity of intelligence, the means just invented to convey more rapidly by rail. Indeed its action is necessary to the latter, since it would be very difficult to operate long lines of railroad, like the New York Erie, and Central, without the aid of the electric telegraph. The patent of Morse, who invented the first practical recording telegraph, was taken out in the year 1840; since then, numerous modes of recording have been invented, and improvements adopted, and there are now many systems in use, although the Morse telegraph in its various modifications, is generally employed in all parts of the world for the general business of telegraphing.

It is curious that just ninety years after Dr. Franklin identified lightning with electricity, by means of his kite, Morse should have schooled electricity to send messages instantaneously over wire at great distances. We say instantaneously, because the ascertained speed of electricity over wires without resistance is 288,000 miles per second, which is scarcely perceptible, although at that

rate it would take six minutes to send a despatch to the sun.

This all-pervading element manifests itself in countless ways—in the sparkling of animal hair; in the rustling of silk, which "betrays your poor heart to woman;" in the aurora that illumines the North; in the meteor that startles the astonished observer; it flashes in the lightning bolt that rives the oak, without, while it gently penetrates into the lady's parlor and fills her form, as she glides over her warm, thick carpet, until the metal tube of the gas burner will attract enough from her fingers to ignite the gas, or from her lips to startle a newly-entered friend. It will also convey to her the thoughts of distant minds with more than the assiduity of Puck, by means of the invention of Morse.

Professor Morse was not the discoverer of the analogy between magnetism and electricity, but he was the first who made practicable all former discoveries and improvements in the production of a recording telegraph. The three leading properties of electricity that make telegraphs possible, are, first, its constant desire to seek an equilibrium, always going where there is less; second, that the production of electricity is always in two fluids, called positive and negative, which possess a mutual attraction for each other; third, that different substances have very different conducting powers—over some it passes with the utmost freedom, while over others it will scarcely pass at all. On this depends the possibility of telegraphing, since by it the current of electricity may be arrested or conveyed at the will of the operator. Mr. William Sturgeon of London, discovered in 1825 that when a bar of soft iron was placed within a coil of conducting wires it was rendered magnetic, and would so remain as long as the current of electricity passed through the wires. The telegraph consists in connecting two of these magnets by a wire of any number of miles



John F. B. Morse

in length, and directing through it a current from an electric battery. By cutting off the current, the iron becomes alternately charged and at rest with great rapidity. To form the current, it is necessary that the wire should form a circuit, or that each end of the wire should communicate with the ground. The interruption is caused by stopping this communication. The first telegraph invented by Professor Morse consisted of an electro-magnet, formed by bending a small rod of iron in the form of a horse-shoe, upon which was wound a few yards of copper wire insulated with cotton thread. This magnet was then placed upon the middle of a painter's stretching frame for canvass, the bottom of which was nailed to the edge of a common table. Across the lower part of the frame was constructed a narrow trough to hold three narrow cylinders of wood. A wooden clock was placed at one end of this trough. The cylinder next to the clock had a small pulley-wheel fixed upon its prolonged axis, outside the trough; a similar pulley-wheel was fixed upon the prolonged axis of one of the slower wheels of the train of wheels outside the clock; these two pulley-wheels were connected by an endless cord or band. Upon the cylinder farthest from the clock was wound a ribbon of paper, which, when the clock train was put in motion was gradually unrolled and passing over the middle cylinder was rolled up upon the cylinder nearest the clock by means of the cord and pulleys.

An A shaped pendulum was suspended by its apex from the centre of the top of the frame, directly above the centre of the middle cylinder in the trough below. This lever was made of two thin rules of wood meeting at the top but opening downwards about one inch apart and joined at the bottom by a transverse bar (which was close to the paper as it moved over the middle cylinder,) and another about one inch above it. Through the centre of these two bars a small tube was fixed through which a pencil loosely played. The pencil had a small weight upon its top to keep the point in constant contact with the paper ribbon. Upon the lever directly opposite to the poles of the electro-magnet was fastened the armature of the magnet or a small bar of soft iron. The movement of the lever was guided by stops on the frame at the sides of the lever, permitting it only a movement forward to and back from the magnet; the

pencil at the bottom of the lever was thus allowed to advance when the magnet was charged and to retreat when discharged, about one eighth of an inch. The lever advanced by the attraction of the magnet and was retracted by a weight or spring.

The voltaic battery or generator of electricity was connected by one of its poles to one of the helices of the magnet while the other pole was connected with a mercury cup; and a conjunctive wire connected a second mercury cup to the other helix of the magnet. The circuit was closed by dipping a forked wire into the two cups of mercury, when the magnet became charged, the armature was attracted, and the lever drawn toward the magnet. When the forked wire was removed the magnet was discharged and the spring brought back the lever to its normal position. When the clock work was put in motion the ribbon of paper was drawn over the middle cylinder and the pencil attached to the lever being in constant contact with the ribbon of paper traced a continuous line lengthwise with the ribbon.

The pathway of the pencil point, when the lever was attracted towards and held by the magnet for a longer or shorter time, contains the three elements of points, spaces and lines, forming by their various combinations, the various conventional characters for numerals and letters.

Professor Morse subsequently modified the form of his telegraph, although the principle upon which its action depended remained substantially the same. In place of the wooden cylinders operated by a wooden clock for carrying the paper band at a regular rate, he employed small brass rollers moved by means of mechanism analogous to clock-work; and instead of the armature being attached to a wooden pendulum which vibrated over the paper, he attached it to one end of a brass lever sustained in a horizontal position by two pivots, the other end of the lever being armed with a steel point. Under the soft iron armature at one end of the lever was placed an electro-magnet, while the steel point at the other end of the lever, was beneath the roller which carried the band of paper. Now when the circuit is closed—that is completed—the armature of the electro-magnet is attracted through the magnetism created in the helix by the passage of the electric current, and this attraction causes the point of the pen to touch the paper and

to trace upon it a line the length of which depends upon the duration of time in which the circuit remains whole. If the circuit is opened the current ceases to flow, the magnetism disappears instantly and a spring attached to the lever draws it away from the paper and the line ceases. By opening and closing the circuit rapidly dots are produced upon the paper the number of which depends upon the number of times that the circuit is broken and closed. If the circuit is closed for a longer time a dash or a short line is made upon the paper. We have thus the combinations of an alphabet of dots and lines. Thus *a* is a dot and a dash, *b* a dash and three dots, &c. The alphabet is so arranged that those letters occurring most frequently are more easily transmitted; thus *e* is one dot; *t* one dash. An expert operator can transmit from thirty to forty words a minute by this instrument on a land line of 200 or 300 miles in length.

The transmitting apparatus is very simple, being designed only for the opening and closing of the circuit in a manner more easy than by holding the ends of the wire in the hands, as is done where there is no apparatus. The two ends of wire are separated by two pieces of metal, one of which is a brass lever surmounted by an ivory button, and the other is a brass anvil tipped with platinum. The brass lever is mounted upon pivots, in front of the axis of which is soldered a nipple of platinum, which by the depression of the lever comes in contact with the platinum tipped anvil, and thus closes the circuit.

To the Morse system at a later period, was added the "sounder," a simple contrivance, by which signals are conveyed by sound. Up to 1850 the operator read the dispatch from slips of paper to the copyist, who wrote it down. It was soon found, however, that the despatch could be read by the "click" of the instruments, and the operator now copies, himself, from sound.

Several modifications of the Morse telegraph have been made, the principal of which is to substitute ink marking for embossing. The Morse telegraph in its various modifications is now used almost exclusively throughout the world.

The number of inventions connected with the electric telegraph is almost endless, and would engross a long series of volumes for their description; but the only system at present in use for general telegraphic com-

munication in the United States, besides the Morse, is the letter printing telegraph, invented by Mr. G. M. Phelps, and this instrument is only used in four out of the six thousand telegraphic stations in the United States.

Professor Morse had no sooner shown that a telegraph could be constructed through the aid of electricity than his attention was turned to the discovery of some insulating substance by means of which the wires could be enveloped and buried in the earth, it not being deemed practicable to place them in the open air. Tarred yarn saturated with a preparation of asphaltum, was among the first insulating materials used for this purpose, and the lines constructed in 1843 were covered with this substance, and buried in the earth. This insulation proved so faulty, however, that it was at once abandoned, and the wires were insulated with glass upon poles in the open air. Still if it was decided to relinquish the idea of building subterranean lines, the fact was apparent that some good insulating material must be found which would permit the submergence of the wires across straits or navigable rivers. Various substances were tried to accomplish this result, but nothing satisfactory was obtained until the discovery of gutta percha, which proved to be one of the most perfect insulators known, and admirably adapted by its plastic and flexible qualities for the insulation of submarine wires.

In 1850 the first electric cable was laid in the open sea between England and France. This cable consisted of a solid copper wire, covered with gutta percha. The landing place in France was Cape Grissiez, from which place a few messages passed sufficient to test the accuracy of the principle. The communication thus established between the continent and England was, after a few hours, abruptly stopped. A diligent fisherman, plying his vocation, took up part of the cable in his trawl and cut off a piece which he brought in triumph to Boulogne, where he exhibited it as a specimen of rare sea-weed, with its centre filled with gold. It is believed that this *piscator ignobilis* returned again and again to search for further specimens of this treasure of the deep. It is, at all events, perfectly certain that he succeeded in destroying the submarine cable.

This accident caused the attention of scientific men to be directed to the discovery of some mode of preserving submarine cables

from similar casualties, and it was decided, that the wire insulated by gutta percha should form a core or centre to a wire rope, so as to give protection to it during the process of paying out and laying down, as well as to guard it from rocks and the anchors of vessels.

In 1851 a cable protected in this manner was laid between Dover and Calais, where

Amongst the most important submarine lines are those which were laid across the Atlantic Ocean in 1865 and 1866.

The conductor of these cables consists of a copper strand of seven wires, six laid round one, and weighing 300 lbs. per mile.

The insulation consists of four layers of gutta percha laid in alternately with four thin layers of Chatterton's compound.

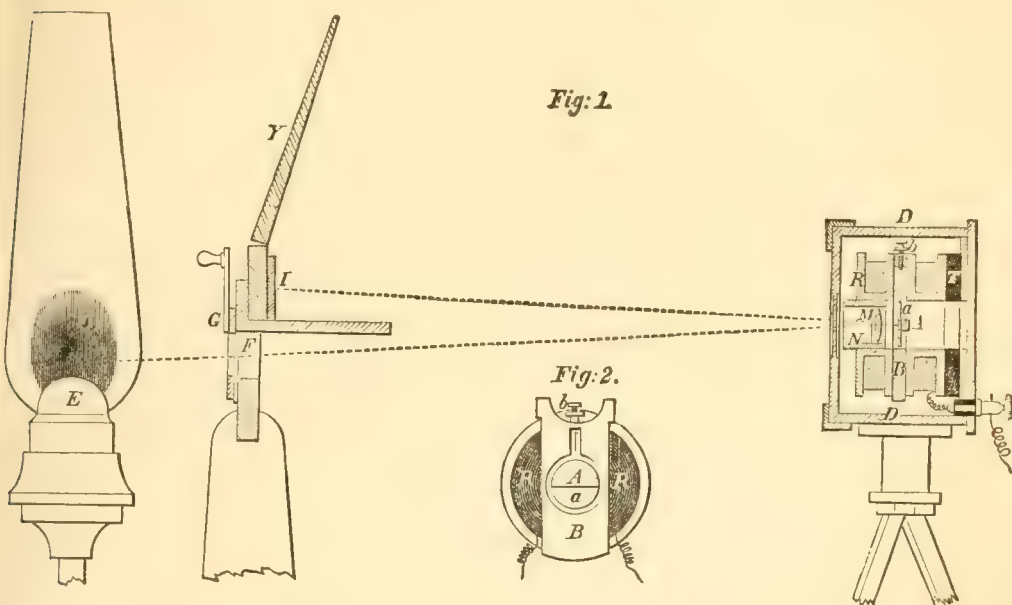


Fig. 1 is a side elevation of the instrument, showing a section through the galvanometer coils, and Fig. 2 a cross section showing the magnetic needle. The same letters refer to like parts in both figures. *A* is the magnetic needle attached to the circular mirror of silvered glass *a*, which is suspended by a thread of cocoon silk in the brass frame *B*, and adjusted by the screw *b*. The frame slides into a vertical groove in the center of the coil which divides it into two parts. The coil and mirror are enclosed in a glass case *D*, in order to prevent the disturbance of the needle by currents of air. The rays from the lamp *E* pass through the opening *F*, which is adjustable by the slide *G*, and passing through the lens *M* in the tube *N* are reflected by the mirror back through the lens upon an ivory scale at *I* as shown by the dotted lines. The scale is horizontal, extending to the right and left of the center of the instrument, the zero point being exactly opposite the lens. The luminous rays of light are brought to a sharp focus upon the scale by a sliding adjustment of the lens.

The operator reads the signals from a point just in the rear of the magnet and coils, the light of the lamp being cut off by the screen *Y* so that he only sees the small luminous slit through which the light enters the instrument, and a brilliantly defined image of the slit upon the white ivory scale just above, which is kept in deep shadow by the screen *Y*. A very minute displacement of the magnet gives a very large movement of the ray of light on the scale *I*, the angular displacement of the ray of light being double that of the needle.

it has ever since remained in perfect order, constituting the great channel of electrical communication between England and the continent. The success of that form of cable having been thus completely established, lines of a similar character were subsequently laid in all quarters of the world.

The external protection consists of ten steel wires, each wire surrounded separately with five strands of tarred Manilla hemp and the whole laid spirally round the core, which latter is padded with tanned jute yarn. Each cable would bear eleven knots of itself in water without breaking.

The deepest water encountered was 2,400 fathoms, and the distance between Valentia and Hearts Content 1670 knots. The length of the cables of 1865—1896 knots; 1866—1858 knots.

The battery employed upon the Atlantic cables is a modification of Daniell's. 12 cells are sufficient for signaling. The receiving instrument is Thomson's Reflecting Galvanometer. This consists of a needle formed of a piece of watch spring three-eighths of an inch in length. The needle is suspended by a thread of cocoon-silk without torsion. The needle lies in the centre of an exceedingly delicate galvanometer coil. A circular mirror of silvered glass is fixed to the needle, and reflects at right angles to it in the plane of its motion. It is so curved that when the light of a lamp is thrown through a fine slit on it, the image of the slit is reflected on a scale about three feet off, placed a little above the front of the flame. Deflections to the extent of half an inch along any part of the scale are sufficient for one signal. In so delicate an instrument, the sluggish swing of the needle in finally settling into any position would destroy its usefulness. To rectify this, a strong magnet, about eight inches long, and bent concave to the instrument, is made to slide up and down a rod placed in the line of the suspending thread above the instrument. This magnet can be easily shifted as necessity may require. The oscillations of the needle due to itself are, by the aid of the strong magnet, made so sudden and short as only to broaden the spot of light. The delicacy of even this exceedingly delicate galvanometer can be immensely increased by using an astatic needle.

The alphabet is made by opposite movements produced by one or other of two Morse keys. The signals need not be made from zero as a starting point. The eye can easily distinguish, at any point in the scale to which the spot of light may be deflected, the beginning and the end of a signal, and when its motion is caused by the proper action of the needle or by currents. It is thus that the mirror galvanometer is adapted to cable signaling, not only by its extreme delicacy, but also by its quickness. The deflections of the spot of light have been aptly compared to a handwriting no one letter of which is distinctly formed, but yet is quite intelligible to the practised eye. Signals in this way follow each other with

wonderful rapidity. A low speed—some eight words a minute—is adopted for public messages; but when the clerks communicate with each other, as high a speed as eighteen or twenty words is attained. In fact, it is said, that the only limit is the power of reading, not transmitting signals. As it is the speed of signaling is equal to, if not greater than, that attained on any land line of the same length, an achievement indicative of the skill and genius that have been directed to Atlantic telegraphy.

Telegraphic stations must be united by one insulated wire, either carried overland, or under the sea. The insulation of land lines is insured by attaching the wires to insulators fixed on posts some twenty feet high. The posts are placed at distances of about sixty yards apart. Insulators are of all shapes and many materials. The insulator most generally used in the United States is made of glass, and is supported by a wooden pin. The leakage in a long line, notwithstanding the best insulation, is considerable. The loss at each post is insignificant, but when hundreds or thousands are taken into account it becomes decided; so that in extremely wet weather in some cases merely a fraction of the total current that sets out reaches the earth at the distant station.

The wire most employed for land lines in the United States is No. 9 galvanized iron wire, although there is considerable of No. 8, and a few thousand miles of No. 7 and 6 in use.

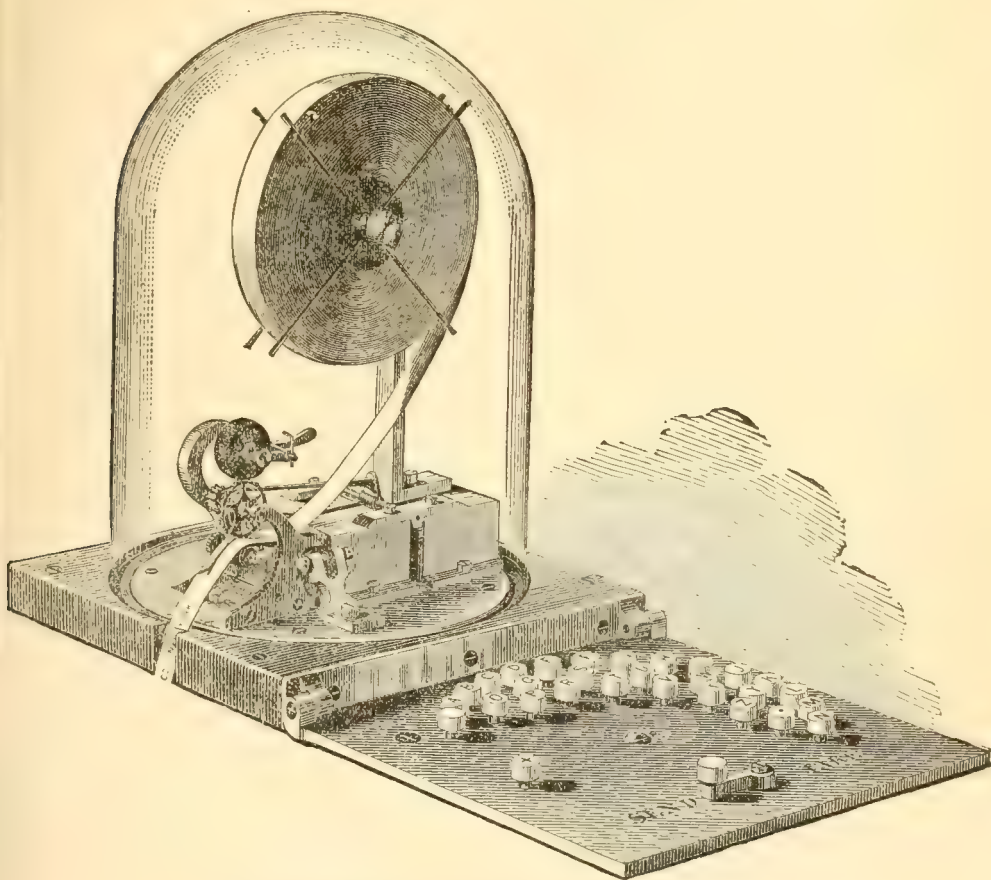
But a little more than a quarter of a century has elapsed since the electric telegraph was introduced to the public as a practical means of communicating intelligence. The first line constructed in the United States was put in operation in the month of June, 1844, between Washington and Baltimore. Up to this time the electric telegraph had been regarded only as a curious theoretical science without practical application.

As far back as 1834, Messrs. Gauss and Weber constructed a line of telegraph over the houses and steeples of Gottingen, using galvanic electricity and the phenomenon of magnetic induction as a motor. The slow oscillations of magnetic bars, caused by the passage of electric currents, and observed through a telescope furnished the signals for corresponding, but the operation was complicated, slow and inefficient. In 1837, M. Steinheil established a line of telegraph be-

tween Munich and Bogenhausen, a distance of twelve miles; and in 1838, Professor Wheatstone constructed a line between London and Birmingham, but the apparatus employed by each was crude and unsatisfactory, and it was not until Professor Morse perfected his simple and reliable system, that the electric telegraph became of practical utility.

make them a present of a hundred dollars, but that he would not have his name associated as a stockholder in so wild and chimerical a scheme. After the line was completed, this incorrigible skeptic was amongst the first and best patrons of the company.

As a natural consequence of the distrust of capitalists, and the great difficulty of raising funds for properly building the lines,



STOCK REPORTING AND PRIVATE LINE TELEGRAPH

During the first few years after the introduction of the electric telegraph its progress was very slow. Capitalists were afraid to invest in an undertaking so novel and precarious. When one of the most distinguished financiers of New York was asked by the projectors to subscribe towards the construction of the first line from Baltimore to New York, he replied that he would

they were constructed in a very unreliable manner and breaks and interruptions was rather the normal condition of the wires than the exception.

At the commencement of 1848, the length of telegraph wire in operation in this country was about 3,000 miles. At the present time there are not less than 150,000 miles in successful operation within the limits of

the United States, having over 5,000 stations and employing upwards of 10,000 operators and clerks. The gross receipts of the various telegraph companies in this country amounts to upwards of \$9,000,000 per annum, while the aggregate capital employed is more than \$60,000,000.

The various uses to which the telegraph has been applied is almost innumerable. Amongst the most important of them may be mentioned its application to the running of trains on railroads; the giving of alarms of fire in our principal cities; its employment in scientific and astronomical observations, and the transmission of weather reports. Within the past few years a new field of usefulness has been opened and partially developed in the application of the telegraph to stock reporting and private line purposes, and in which it has already achieved a marked success, with promise of becoming in the future a still more important branch of the business. The instruments used for this purpose print the dispatches in plain Roman letters without the aid of an operator at the receiving station. Through the aid of this apparatus stock and market quotations are received at the Exchanges, Banking-houses and other places of public resort in the chief commercial cities of the United States at all hours of the day. This new enterprise, which was inaugurated in 1868, has become one of the most important features of the telegraphic business.

In December, 1870, a general system of telegraphic money orders or transfers was put into operation in the Pacific States. The public demand for the use of facilities for telegraphic exchange had long been apparent, and had induced the authorization of a limited amount of business which was conducted with success and profit; but the need was felt of a system which could be adopted generally, without bringing in at the same time new and serious risks. This object has now been attained, and arrangements have been made for opening money-order offices in all parts of the country.

Congress having, by joint resolution, authorized the Secretary of War to provide for taking Meteorological observations at various points in the United States and Territories, and for their transmission by telegraph to stations on the Northern Lakes and Eastern Seaboard, arrangements were made with the Western Union Telegraph Company for the performance of the tele-

graphic service commencing on the first of November, 1870. Sixteen circuits are occupied, embracing fifty-five stations, from which three daily reports are transmitted to Washington, copies being also dropped at intermediate stations on each circuit, making an aggregate daily transmission of 20,000 words.

The synchronous transmission, three times per day, of meteorological observations from fifty-five stations embracing a territory covering 25 degrees of Latitude and 55 degrees of Longitude is unparalleled in the history of the telegraph; and the eminently successful manner in which this great undertaking has been performed, affords good evidence of the superior condition and operation of the telegraph lines in this country.

On the first of October, 1869, the Western Union Telegraph Company, which operates lines in every State and Territory in the Union, adopted a new Air Line Tariff for the transmission of messages, causing an average reduction of about 15 per cent. and on the first of January, 1870, inaugurated a new feature in telegraphy whereby messages could be received at and for all stations in the United States for transmission during the night and delivery the next day at one half the usual tariff rates.

In Europe the telegraphs, with the exception of the submarine lines, are nearly all owned and controlled by the Governments, and in England, Belgium, and Switzerland, they are connected with the postal service. In continental Europe the annual expenditures for the telegraphic service exceed the receipts by about two millions of dollars. In England the telegraphs were purchased by the Government in January, 1870. Since then the Government has expended about three million of dollars in excess of the receipts, but, as a portion of this expenditure is for new construction, it is uncertain how great the annual discrepancy will be.

The progress of the electric telegraph within the past six years has been very great in every quarter of the globe. Upon this continent the electric wire extends from the Gulf of the St. Lawrence to the Gulf of Mexico, and from the Atlantic to the Pacific Ocean. Three cables span the Atlantic Ocean, connecting America with Europe, and another submerged in the Gulf Stream, unites us with the queen of the Antilles. Unbroken telegraphic communication exists between all

places in America and all parts of Europe; with Tripoli and Algiers in Africa; Cairo in Egypt; Teheran in Persia; Jerusalem in Syria; Bagdad and Nineveh, in Asiatic Turkey; Bombay, Calcutta, and other important cities in India; Hong-Kong and Shanghai in China; Irkoutsk, the capital of Eastern Siberia; Kiakhta on the borders of China; Nagasaki in Japan; Havana and all important towns in Cuba, and to New Westminster in British Columbia. But, however rapid the extension of the telegraph has been in the past, it is destined to show still greater advancement in the future. Neither the American nor the European system has yet attained to its ultimate development. Submarine cables will shortly be laid connecting the United States with all the West India Islands and with Mexico and South America. The telegraph is already established in various parts of the latter country, and in Brazil and Peru arrangements are now making for largely extending them. The project of connecting Vera Cruz and New Orleans by a submarine cable is likely to be soon realized, while a line is now completed between New Orleans and the city of Mexico.

A direct line of telegraph under one control and management has recently been established between London and India with extensions to Singapore and China, which will soon be continued to Australia.

Europe possesses 450,000 miles of telegraphic wire and 13,000 stations; America 180,000 miles of wire and 6,000 stations; India 14,000 miles of wire and 200 stations; and Australia 10,000 miles of wire and 270 stations; and the extension throughout the world is now at the rate of 100,000 miles of wire per annum. There are in addition 30,000 miles of submarine telegraph wire

now in successful operation, extending beneath the Atlantic and German Oceans; the Baltic, North, Mediterranean, Red, Arabian, Japan and China Seas; the Persian Gulf; the Bay of Biscay, the Strait of Gibraltar, and the Gulfs of Mexico and St. Lawrence.

More than twenty thousand cities and villages are now linked in one continuous chain of telegraphic stations. The mysterious wire with its subtle and invisible influence traverses all civilized lands, and passes beneath oceans, seas, and rivers, bearing messages of business, friendship, and love, and constantly, silently, but powerfully contributing to the peace, happiness, and prosperity of all mankind.

Professor Morse, who was already past middle age when he conceived the idea of the electric telegraph on board of the packet ship Sully on her ever memorable passage from Havre to New York, in 1832, and who was nearly three-score years of age when his first line was built, is still living with mind and body unimpaired, and enjoying at the age of four score the rich fruits of a harvest more abundant than has ever fallen to the lot of any other man. The invention of Professor Morse, which although yet in its infancy, has already conferred inestimable benefits upon the people of more than half the globe without having occasioned a pang of sorrow to a single human being. If he is to be entitled to be esteemed a benefactor who makes two blades of grass to grow where but one grew before, with what honors should we regard him through whom wars have been postponed and shortened, peace promoted and extended, time annihilated and distance abolished, and all the highest and noblest faculties of man multiplied, extended, and enlarged.

THE ARTS OF DESIGN IN AMERICA,

FROM 1780 TO THE PRESENT TIME.

CHAPTER I.

PAINTING, SCULPTURE, AND ENGRAVING.

HORACE WALPOLE says, in his "Anecdotes of Painting in England" (writing in 1762): "As our disputes and politics have travelled to America, is it not probable that poetry and painting, too, will revive amidst those extensive tracts, as they increase in opulence and empire, and where the stores of nature are so various, so magnificent, and so new?"

These lines were penned, perchance, in grave prophetic faith, but it may be that they were only idle speculations—a play of fancy, meaning nothing. Certain it is, that were the critic ever so much in earnest, very little could he have expected the full and noble response which so short a period would make to his query.

Little could he or any one have foreseen the rapid growth of these "extensive tracts" in population and in every phase of material life; still less the wonderful strides which they have made in all branches of mechanical and industrial art; and least of all, their achievements in the higher and æsthetic arts of design. Little could he have dreamed that within a period seemingly insufficient for the construction even of the rude foundations of empire, our country would have reached that point of refinement and intellectual development which gives it, in ample store, its own literature and its own arts—both with a strong and peculiar individuality of character and life.

The only artists in America in Walpole's time were a few strangers—Englishmen for the most part—who had wandered hither in quest of a fortune which their very humble talents had failed to win at home. They did little or nothing toward the development of the public taste, and left no works to honor the future; though they may, perhaps, have served, in some measure, to open the path for the distinguished group of *native* paint-

ers who, quickly succeeding them, fairly and surely lighted the lamp of art which now burns with such pure and ever-growing brightness.

The earliest of these pioneers, whose name has been preserved, was John Watson, a native of Scotland. He crossed the seas and set up his easel in Perth Amboy, in New Jersey, in the year 1715. In this little port, which was then thought destined to be what the city of New York is now—the commercial emporium of the country—Watson painted portraits, such as they were, through a long life. He appears to have had plenty of "sitters," and to have grown rich upon the fruits of well-employed industry; but we can gather no intimations of the state of the popular taste at that time through the medium of his works, inasmuch as none of them now remain for our inspection. Watson was buried about the 22d of August, 1768, in the old church-yard of his adopted village, at the venerable age of eighty-three years.

Our next pioneer was John Smybert, a stronger man, much, than Watson, and one who, though he painted no pictures to be treasured in our galleries, yet left foot-prints of good incentive and example, which we may clearly trace beneath the subsequent march of greater gifts. Copley, though but thirteen years of age at the time of Smybert's death, confesses indebtedness to him and his works. So also does Trumbull, who at one time painted in the apartments he had occupied, and in which many of his pictures still remained; while Allston is thankful for the advantage he enjoyed in the permission to copy a head which Smybert had executed after Vandyke. Smybert accompanied Bishop Berkeley to America in the year 1728, at the age of forty-two. Like Watson, he was a Scotchman, and like him, again, he pursued his craft in the colonies with gratifying financial success. He lived in Boston in high public

favor until 1751, leaving behind him many portraits of the distinguished characters of his time.

Nathaniel Smybert, a son of John Smybert, followed his father's profession worthily in Boston for a short time, and, according to the opinion of cotemporary critics, gave promise of more than ordinary talents. No record of him remains beyond the meagre facts here mentioned, and the additional one that he died early.

While the Smyberts were planting the seeds of art in Boston, there was in Philadelphia a Mr. Williams, an Englishman, remembered gratefully by West as the man who awakened his love of pictures by lending him books and by showing him the first works in oil which he had ever looked upon. During the same period, Woolaston and Taylor were also in Philadelphia; a Mr. Hesselius was at Annapolis in Maryland; a Mr. Theus in Charleston, and other laborers were in Virginia.

Besides the foreign adventurers here spoken of, there were a few native artists scattered over the country during the ante-revolutionary period of our history. It is hardly desirable to recall even their names, or to add to our list of the yet earlier strangers; since, despite the service their little light may have done, in the then deep darkness, not one of them all possessed more than the most moderate talent, and not one will be remembered excepting in the way in which they are now so briefly referred to—that is, in consideration of the *initial* times in which they chanced to live.

The birth of American art was not in any portion of our colonial epoch, but singularly and felicitously enough, was in that day of happy augury when our country itself sprang into life, and started upon its conquering course of national development and power; and with equal strangeness and equal felicity, the very beginning of our individual existence as a people produced, on a sudden, full-grown artists of first-rate genius, as it did Minerva-born statesmen, soldiers, and philosophers.

During the progress of our great revolutionary struggle with the mother land, and at the time of our successful emergence from that trial, Benjamin West, born in the forests of Pennsylvania, was reaching the highest honors in the art world of London, surpassing all native competitors, becoming the successor of Reynolds in the presidential

chair of the English Academy, and enjoying the most distinguished consideration, the patronage, and the personal friendship of the very monarch against whom his countrymen were waging angry war.

It is, then, with Benjamin West, and with the birth of our country as an independent nation—about a hundred years since, in 1772—that our story of American art properly and prosperously begins. We shall, however, say but little of West, since the space that has been allotted to this subject does not afford room for an extended notice of any one. Though we may rightfully honor him as the father of American painters, and may write his name first on the long catalogue of eminent laborers in the noble field of art which we now possess, yet, the fact that the greater part of his professional life was spent in England, and that his chief success was won there, places him, in one sense, among the painters of that country, rather than of this; just as the life-long residence among us of a foreign-born artist may make him ours, instead of his own countrymen's.

West was born in 1738, in Pennsylvania, as we have already said, near Springfield, Chester county. His parents were Quakers, and their habits of life, together with all surrounding circumstances, were such as to discourage rather than foster a predisposition toward the study of art. The bent of the boy's mind was, nevertheless, early and powerfully manifested. The sight of Williams' pictures inflamed his youthful predilections to such a degree that, in want of better pencils, he manufactured a supply from the stolen fur of his mother's favorite cat; in want of subjects, he, while yet a child, seized upon his infant sister sleeping, all unconscious, in her cradle; and in want of pigments, he borrowed ochres of the Delaware and Mohawk Indians, and indigo from the maternal laundry! He studied after a while in Philadelphia, and subsequently painted portraits in New York. At the age of twenty-one he went abroad, and after a tour through the art cities of the continent, he established himself in London, where he afterward chiefly resided, rising rapidly into popular favor, until, upon the death of Sir Joshua Reynolds, the first president of the Royal Academy, his position as the head of the English school was affirmed by the high honor of his election to the vacant chair. This distinguished position

he filled with great dignity until his death, on the 11th of March, 1820, at the advanced age of nearly eighty-two years.

West's fame was won chiefly in the noble field of historical painting—a department which his brother artists of America have not continued fittingly to cultivate; though one in which they cannot, in due time, yet fail to distinguish themselves no less honorably than they have already done in landscape and portraiture; so rich and boundless are the themes at their command, and growing with every passing year yet more beautiful and noble in aspect.

Among the chief productions of his skillful and most industrious pencil, we may mention the Battles of the Hague and the Boyne; the Death of General Wolfe; the Return of Regulus to Carthage; Agrippina Bearing the Ashes of Germanicus; the Young Hannibal Swearing Eternal Enmity to the Romans; the Death of Epaminondas; the Death of Chevalier Bayard; Penn's Treaty with the Indians; Death on the Pale Horse; and Christ Healing the Sick. Many of his works are now in America; among others, Death on the Pale Horse, which is in the galleries of the Pennsylvania Academy of Fine Arts in Philadelphia; and Christ Healing the Sick, also in Philadelphia, in the Pennsylvania Hospital, to which it was given with noble generosity by the artist himself.

In the same year in which West was born in Pennsylvania, John Singleton Copley, another distinguished man in the earlier days of American art, appeared in the city of Boston. The one, like the other, after following his profession at home for some time, went to London, and there continued to live and labor for the rest of his days. The simultaneous appearance of these two gifted men, at this early period of our country's progress, and in sections of the Union then so far separated, was, as Cunningham says, when alluding to the circumstance—most "noteworthy." Copley was occupied for the most part with portraits, though he made successful incursions at intervals into the domains of history. One of his best works in this department of the art, and that to which he first owed his fame, was the large canvas representing the Death of the Earl of Chatham. Copley died in 1815, five years earlier than his *confrère*, Benjamin West. Many of his pictures are now treasured in the galleries and in the private collections of Boston, and in other parts of the Union. Lord

Lyndhurst, of England, was a son of this artist.

In 1754, just sixteen years after the birth of West and Copley, Gilbert Stuart, of Rhode Island, came upon the stage, the earliest of that gifted line of portrait painters whose works have placed this branch of the art as high in America as in any part of the old world. Stuart, with Trumbull as a companion, studied under West in London, where he afterward painted successfully, and in due time rose to great eminence. Unlike his distinguished predecessors, West and Copley, he returned after a time, to his native land, and after some years practice of his art in Philadelphia, Washington, and Boston, he died in the latter city in July, 1828, in his seventy-fifth year. His name is familiar to the public at large, through his great picture of Washington, which he repeated for various societies and state legislatures, and which is spread over our land in every style of the graver's art. He painted noble portraits of many other of the distinguished people of his time—from presidents to private gentlemen. His works are cherished among us as master-pieces and models, exerting still, as they have ever done, a marked influence upon the character of American portraiture. The especial characteristics of his style were a marvellous freedom and boldness of touch, a wonderful freshness and fullness of color, and a truth of character which placed the very soul of his sitter before you in the most striking individuality. "He seemed," says a cotemporary writer, "to dive into the thoughts of men—for they are made to rise and speak on the surface;" and Sully is reported to have remarked of one of his portraits: "*It is a living man looking directly at you!*"

Stuart was a man of eminent social disposition and abilities, a famous wag and humorist, fond of a jest, and overflowing with anecdote. Innumerable amusing illustrations of this trait in his character, sprinkle and enliven the recorded and remembered records of his life.

Another pupil of West's, at this period, was Robert Fulton, who was born in Little Britain, in the county of Lancaster, Pa., in 1765. Fulton commenced the practice of art in 1782, at the age of seventeen, but continued it only a few years, being more powerfully led toward those scientific studies to which his genius was, as the end proved, better adapted; and from which sprang that

glory of our time, the practical and permanent application of steam to navigation. Fulton's short career as an artist left no legible mark; what might have been his achievements had he continued in the guild, we cannot say, and are, indeed, careless to inquire, in view of his immortal labors otherwise. American art is willing to spare him, as it has since spared the illustrious Morse, to its graver sister, Science; and is no less proud of the practical blessings he has bestowed upon his country, than it would be of the highest æsthetic success. Fulton died upon the 24th of February, 1815.

Next among the men of service and influence in the cause of art in America was William Dunlap, who was born in Perth Amboy, N.J., February 19th, 1766, and who commenced the profession of portrait painter about 1782. Dunlap will be remembered as an artist more for his long life of reverent and persistent devotion to the craft, and for the respect and estimation which his character gained for it, than for his success at the easel; though he both attempted and achieved works which were commended at a less brilliant period than the present. He was also an author of considerable ability. Among his works is a "History of the American Theatre," published in 1832, and another of the New Netherlands, which appeared in 1840; a memoir of Charles Brockden Brown, and various plays of considerable interest. But the most important of his literary labors is the only record we possess of the early story of American art, an invaluable work under the circumstances, and one for which he will be ever remembered, although clumsily constructed and injured by a most wearisome medley of irrelevant matter. In this "History of the Arts of Design," Dunlap gives us his own biography with great discursiveness and fulness, though with humble and characteristic reverence, exhibiting his own career as one to be shunned rather than followed.

"I look back," he says in mournful reflection, "upon a long life, with the persuasion that what is called misfortune in common parlance is caused generally by our own folly, ignorance, mistakes, or vices." To read his story as recorded in his "History of the Arts of Design," is to read a sad record of untoward circumstances, varied effort, and ever-following failure; but, withal, a praiseworthy and even exalted longing to be of use to his fellows and his country. His pictures

were generally of a very ambitious character, scriptural themes on canvas twenty feet long. Among these productions of high art were *Christ Rejected*; *Bearing the Cross*; *Calvary*; and *Death on the Pale Horse*; the first of which was made up in part, and the last wholly, from West's pictures of the same names.

Besides thus remembering Dunlap for the art records which he has preserved with so much honesty and industry, and for what he would have done, and sought to lead others to do at the easel, he must be honored as one of the founders and the first vice-president of our leading art society, the National Academy of Design in New York. Dunlap died on the 28th of September, 1839.

To the life and works of Colonel John Trumbull our early art owes great obligations, though it is much the fashion at this day to disparage and deny his genius. Trumbull's name is familiar to the people through his grand pictures of revolutionary story which decorate the walls of the national capitol. He was the son of the first governor Trumbull of Connecticut, and was born at Lebanon on the 6th of June, 1756. To high birth he added, through life, high character and learning, and great culture and dignity of manners. His early studies were, as was the case with all the artists of his time, pursued abroad and under Benjamin West. He entered the American army at the commencement of the Revolution, and was an eye-witness of, and participant in, some of its most stirring scenes, of which the subsequent delineation won for him his fame as a painter. The four large works executed for the government, are: the Declaration of Independence; the Surrender of Cornwallis; the Surrender of Burgoyne; and Washington's Resignation. An appropriation of thirty-two thousand dollars was made for these pictures, besides which, the artist received considerable emolument from their public exhibition through the country. Among his other historical works may be mentioned the Battle of Bunker Hill; the Death of General Montgomery; Capture of the Hessians at Trenton; and the Death of General Mercer at the Battle of Princeton. In addition, he executed various scriptural subjects, and many portraits, among which was a full-length of Washington, painted in 1792, in the artist's best days. A few years before his death, he presented his collected works to Yale

College, upon the condition that they should be suitably housed, and that he should receive an annuity of one thousand dollars. The college erected a gallery on its grounds in New Haven, where the pictures were placed, and where they now may be seen.

Colonel Trumbull was president of the American Academy of Fine Arts, in New York, until that effete organization was superseded in 1826 by the establishment of the National Academy of Design. Trumbull did not, at any period of his life, possess much of that genial fellowship and social habit so characteristic of artists, and so essential to personal popularity in the profession. He died in 1843, at the venerable age of eighty-seven years, leaving behind him a name unspotted, and a claim to distinguished remembrance in the history of art in America, despite all the faults of his works, and however much they have since been or yet may be surpassed.

Charles W. Peale, born at Chesterton, on the eastern shore of Maryland, April 16th, 1741, was an active colaborer with Trumbull and his fellows, but was not eminently successful at the easel. He was a man of versatile gifts, and at various times dabbled in all sorts of crafts. He made his brothers, sisters, sons, and daughters all artists. He died in 1827, at the age of eighty-five years.

John Vanderlyn was born in Kingston, in the state of New York, in October, 1776, where he died at the age of seventy-six years, in 1852. Aaron Burr was struck with his boyish performances in art while he was a blacksmith's apprentice in his native village, and befriended him at the commencement of his career. At the age of twenty he made the foreign tour, so customary at the time, studying in Paris and other cities of the continent of Europe. In the year 1817, the corporation of New York having given him the lease of the ground, he erected the building in the north-east corner of the City Hall park in New York, afterward used as the Post Office, and always known as the Rotunda. Here he exhibited in succession a series of panoramas, the first seen in this country, of Paris, Athens, Mexico, and Versailles, with his own pictures—Marius, Ariadne, and other subjects. The unexpected cost of the building, and the resumption of the lease by the city before the artist had fairly tried his speculation, made it a matter of serious pecuniary loss to him. Among his chief pictures are the

Landing of Columbus, which fills one of the panels of the rotunda of the Capitol in Washington—one of the pendants of those already mentioned by Trumbull; his fine picture of Marius Musing over the Ruins of Carthage, painted in 1808; and his superb full-length figure of Ariadne, so beautifully engraved by Durand; portraits of Presidents Madison, Monroe, and Jackson; of Calhoun, De Witt Clinton, and other distinguished men. He exerted a most healthy influence upon his fellow artists, and his works remain as models for future study.

Edward G. Malbone was born in Newport, Rhode Island, in 1777, and died in Savannah, in May, 1807, in his thirty-second year. During his short life he won high reputation as a miniature painter; and his works in this department are still preserved in various parts of the country as masterpieces of art. One of his most successful productions—a picture of three half-length female figures, called *The Hours*—is now in the possession of the Athenæum in Providence.

Rembrandt Peale, whose history belongs to this period, though more recently deceased, was born of a family of artists in Pennsylvania, on the 22d of February, 1778. He was an active, earnest man in his time, and did much in the service of art, by his own works, and the incentive which his example gave to others. His picture of Washington, painted in the artist's boyhood, and afterward often repeated by him, is well known; as also his grand work called *the Court of Death*. His long and honored career, which embraced nearly the whole period of our art history, was closed on the 3d of October, 1860.

John Wesley Jarvis, one of the most distinguished portrait painters of this era, was born in England in 1780, and brought to America at the age of five years. He painted innumerable pictures, many of them of great merit; and did good service as the instructor of Henry Inman, and other distinguished artists. He was a man of eminently social disposition, with a great turn for humor—traits of character pleasant enough when well employed, but which he unhappily permitted to lead him into low and ruinous dissipation, which impaired his artistic powers, and brought a life begun under the happiest promise to the dreariest end.

Charles B. King, born in Newport, Rhode Island, 1785; Alvan Fisher, of New Bedford, Massachusetts, 1792; William E. West,

and William James Bennet, born in London, 1787, may be mentioned in this part of our story as men of mark and influence in their day though they left no works behind them of great excellence. Mr. King, passed away, March 18, 1862, in Washington, the National Capital, where he for many years virtually filled the fashionable position of court painter, preserving to posterity the likenesses of presidents, ministers, statesmen, and the chiefs of the Indian deputations who came to see their great white father at the capital.

The life of Thomas Sully fills a delightful page in the history of American art. Born in England in June, 1783, he came hither at the age of nine years, struggled bravely through an indigent youth and a laborious manhood to a position of high honor and usefulness. He is still pursuing, at the age of 89, in Philadelphia, the profession which he has through many years so effectually contributed to advance. His pictures are characterized by grace and beauty of feeling, and a daintiness and freshness of color well deserving of most careful study. He has painted many full-length pictures of distinguished personages, among them one of Queen Victoria, which was exhibited with great success in all the Atlantic cities, and numerous fancy heads of great poetic beauty.

Charles Fraser, born in Charleston, South Carolina, Aug. 20, 1782, and died there Oct. 5, 1860, was an esteemed associate of the best men of the days of which we write. His works have materially advanced the standard of public taste in his native state. After obtaining a competency by the industrious pursuit of legal studies, he began the profession of artist in earnest at the age of thirty-six. Following the successful lead of his friend Malbone, he turned his attention especially to miniature painting, in which style he executed a picture of Lafayette, and of nearly all of the prominent men of his region. An exhibition of his collected works in 1857, included 313 miniatures, 139 landscapes, and other works in oil.

Chester Harding, who passed away, April 1, 1866, was born in Conway, Mass., Sept. 1st, 1792. His humble parentage sent him at first to farm work and chair-making. After the war of 1812, in which he served, he engaged in cabinet-making in Caledonia, New York. He subsequently went to the head waters of the Alleghany, and thence on a raft to Pittsburg, where he worked at house-painting; he returned home through

the forest, two hundred miles, on foot, with no guide but blazed trees. Again visiting the west with his family, he worked from sign painting into portraiture; thenceforth gradually rising in his profession, until he numbered among his sitters such men as Madison, Monroe, Marshall, Wirt, Clay, Webster, Calhoun, and Allston, in America; and the dukes of Norfolk, Hamilton, and Sussex, Lord Aberdeen, and Samuel Rogers, in England.

Washington Allston, one of the most illustrious of our artists, was a native of South Carolina, having been born on his father's plantation at Waccamaw, in that state, on the 5th of November, 1779. He was a high-toned man, of poetic temperament and scholarly tastes, and was eminent as a poet as well as an artist. He was a student of the Royal Academy in London in 1801, and an exhibitor on the walls of that institution the following year. At this early period of his life he became an intimate friend of Coleridge and Thorwaldsen, West and Fuseli, and other distinguished men. In a second visit to Europe, about 1810, he exhibited his famous picture of the Dead Man Revived, which is now in the Pennsylvania Academy at Philadelphia. For this work a prize of 200 guineas was awarded to him by the British Institution. His next considerable works were: *St. Peter Liberated by the Angel*; *Uriel in the Sun*, which was painted for the duke of Sutherland; and *Jacob's Dream*. In 1818 he returned home, with his picture of *Elijah in the Wilderness*, which afterward went back to England. Within the next twelve years he produced his *Prophet Jeremiah*, recently presented by Prof. Morse to the Art Museum of Yale College; *Saul and the Witch of Endor*; *Miriam Singing the Song of Triumph*, and other justly celebrated works. Among his smaller pictures, the *Valentine* and *Beatrice*, female ideal heads, are remarkable for their power of expression and strength of color. In the studio in which he finally settled himself at Cambridge, he painted Spalatro's *Vision of the Bloody Hand*; *Rosalie*; and his grand unfinished subject, *Belshazzar's Feast*. In his early life he was an intimate friend of Washington Irving, whom he almost won over to his own studies, as the author's profession may have attracted him, for during his life he made frequent incursions into the literary arena, publishing in London, in 1813, a poem entitled "The

Sylphs of the Season," and afterward the metrical satire entitled, "The Two Painters," the weird story of the "Paint King," "Monaldi, a Tale of Passion in Italy," followed after his death by a volume of "Lectures on Art." He was twice married, first in 1809 to a sister of Dr. Channing, and again in 1830. He died at Cambridge on the 9th of July, 1843.

Thomas Birch, a marine painter, born in London 1779, died in Philadelphia Jan. 1851, and Joshua Shaw, a landscape painter, born in England in 1776, died —. Both became residents of the United States in childhood, and gained a reputation in their respective departments.

Among the popular painters of this time were Samuel L. Waldo (1783–1861), and William Jewett, 1795. Mr. Jewett was a pupil and afterwards a partner of Mr. Waldo, and the two painted many portraits together, of great merit.

Our narrative now passes the line, as nearly as such a line may be drawn, between the artists of the revolutionary and immediately following years, and the earlier part of the present century. Already have we seen the arts firmly rooted in the love of the people and the genius of their professors; seen native artists grow up, and by their labors reflect high and imperishable honor on their country. In the continuation and the sequel of our history it will be our pleasure to see this glory ever brightening, and the public taste and artistic skill still more rapidly advancing hand in hand. This progress cannot, however, be better understood than by following, step by step, the lives of those from whose genius and works it alone springs. We therefore continue as we have begun, the chronological mention of the men to whom we are the most indebted for it.

We have already seen how our country had no sooner come of age than its early indebtedness to the mother-land for the humble aid of her Smybert and others, was promptly and nobly repaid by the fame which we sent her of a West and a Copley. Not content with this ample acknowledgment, we added to these high names at a later day those of Leslie and Newton, which she has inscribed upon the brightest tablet of her art achievement. Both these eminent artists were Americans by their parentage, though, through the chances of the moment, the former first saw the light in London. The latter was born in Halifax, in

Nova Scotia, during a temporary visit of his parents thither from Boston. They established themselves in London, where they passed their lives in such successful labors as to leave a name and fame cherished zealously both by their native and their adopted homes.

Some of the men most distinguished and the most serviceable in the cause of art in America who came upon the stage at or near the beginning of the present century, are yet living to see the happy fruits of their toil, in the general diffusion of an appreciative and enduring love of art throughout the land, in the growing up of a community of artists, large and influential enough to have become an acknowledged and revered power in society, and in the firm foundation of a strongly individualized and healthful national school.

Among these great men, we should, perhaps, mention the late Samuel Findley Breese Morse, to whom (though he was drawn out of the profession as Fulton was before him, by the allurements of science) we owe much for the excellent labors of his pencil and the yet more excellent effects of his earnest sympathy with his art brethren throughout his long and illustrious life. It is to this strong and indefatigable love that we are, more than to any other agency, indebted for the foundation and success of our chief art society, the National Academy of Design. Morse was the leading spirit in this great enterprise. He was its first president; an office which he continued to fill with high honor for a score of years, and which, only that other duties required him to resign, he would have filled to this day. Prof. Morse was born in Charlestown, Mass., April 29th, 1791. His father was the famous geographer, the Rev. Jedidiah Morse. He was educated at Yale College under Dr. Dwight. In his twentieth year he went to England, and yet two years later successfully exhibited a large picture of the Dying Hercules at the Royal Academy. He had previously executed a plaster model of the Hercules, which he also displayed, and for which, greatly to his own surprise, he received the *gold medal* from the Society of Arts. From this happy commencement of his life as an artist, and from the portraits and other works which he subsequently produced, until other studies drew his mind away from the easel, we may fairly suppose that he would have reached the highest posi-



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WOMEN ENGAGED IN THE FINE ARTS.

tion as a painter had he continued to seek it, and some regret at his loss to the arts may be permitted, even in view of what the world at large owes to his scientific studies in the priceless gift of the Magnetic Telegraph. Professor Morse died in New York, April 2, 1872.

Charles C. Ingham, an eminent portrait painter, born in Dublin, 1797, died in New York, Dec. 10, 1863. He was an earnest co-laborer with Morse in the establishment of our National Academy, which has always owed and still owes much in its exhibitions to the productions of his easel—his exquisite pictures of fair women and brave men. He filled for some years the office of vice-president of the academy.

Robert W. Weir, who has been for many years, as now, professor of drawing at the Military Academy at West Point, holds a distinguished place among the older of our living artists. He was born on the 18th of January, 1803, at New Rochelle, in the state of New York. It is to his pencil that we owe that best of the pictures in the Capitol at Washington, the Embarkation of the Pilgrims, a work eminently illustrative of the thoughtfulness and conscientiousness of his genius. He has painted numerous historical compositions, *genre* subjects, landscapes, and portraits of great excellence.

Thomas S. Cumings, another of the founders of the Academy, and always one of its officers, held high rank at this period in the department of miniature painting. Mr. Cumings was born in Bath, England, in 1804, and became a resident of the United States in early childhood.

John G. Chapman, born in Alexandria, Virginia, on the 11th of August, 1808, now residing in Italy, is well known as the painter of the Baptism of Pocahontas, in the Capitol at Washington, and as the author of innumerable designs in our illustrated books.

William S. Mount, born in Setauket, L. I., Nov. 1807, died there, Nov. 19, 1868, was the first American artist who achieved success in subjects of a purely national character, in a series of pictures of the humbler features of our country life. His Bargaining for a Horse, Haymaker's Dance, the Power of Music, and other light themes, have been often engraved, and are familiar to everybody.

Francis W. Edmonds, born 1806, died 1860, produced many pleasant pictures in the same vein of quiet humor with Mount.

William Page, born in Albany, Jan. 23, 1811, has distinguished himself, at home and abroad, in the field of portraiture. He painted, also, many excellent classic themes, among them two Venuses, which were greatly admired. Mr. Page has been President of the Academy since May, 1871.

Henry Inman, born in Utica, N. Y., Oct. 20, 1801, died Jan. 17, 1846, was one of the most eminent of American artists. He was a pupil of Jarvis, whom he soon surpassed, excellent as Jarvis was. He was a man of remarkable versatility, and worked with equal facility in portraiture, landscape, and history. He was a guest of Wordsworth, during a visit to England in 1844, at which time he painted a characteristic picture of the great poet, and that charming illustration of the scenery of his region, the Rydal Water. While in England, he painted, also, portraits of Dr. Chalmers, Macaulay, and other eminent people. The exhibition which was made, after his death, of his works, was one of the most interesting and varied ever seen in New York.

With the advent of Asher Brown Durand as a landscape painter, about 1828, begins the development of high art in the department of landscape painting in this country. The few artists who had attempted landscapes before him, had drawn, not from nature so much as from those conventional rules which, both in Europe and America, had supplanted nature. Mr. Durand, already a skilful artist, had from the beginning gone to the forest, the mountain, the lake, and the glen, for his inspiration, and his one thought was to reproduce in all its beauty of form, position, variety, and color, nature as its perfection gladdened his eyes. Mr. Durand was born in Jefferson, N. J., Aug. 21, 1796. His father was a watchmaker and in a small way an engraver of cyphers, coats of arms, and designs upon silver and gold. The son had from early childhood an insatiable taste for the arts of design, and when a mere lad, was remarkable for the felicity of his designs for the plate, &c., of his father's customers, and for his deftness and skill in transferring them to the metal. He had also tried his hand at engraving and printing watch papers and other little sketches which he traced on thin sheets of copper hammered out from spare pennies. He acquired a very thorough knowledge of every branch of the engraver's art under Mr. Maverick, whose partner he afterwards became, and attained the reputa-

tion of being the finest engraver of the New World, and the peer of the best in Europe, by his engraving of Vanderlyn's "Ariadne," before he had gained any considerable reputation as a painter. He had been, however, for years secretly trying his powers as a painter, before he had the courage to show his pictures to any one. He was thirty years old when he exhibited his first painting—a portrait of his child—at the Academy, but from that time forward, the exhibition of each year always contained one or two of them, and his truthfulness to nature, the care and fidelity of his drawing, and his exquisite taste in color, have made his pictures a perpetual delight. In 1844, he was chosen vice-president, and in 1845 president of the National Academy, and was reelected each year till 1861, when he declined in order to bring about the reelection of Prof. Morse. Though now (1872) in his 76th year, Mr. Durand is still active as ever, and paints as well as he did thirty years ago. His landscapes are widely known and highly prized.

Thomas Cole, born in England, Feb. 1, 1801, died in Catskill, N. Y., Feb. 11, 1848, was the associate and intimate friend of Durand, till his death, all too soon, severed the ties that bound them together. He came to this country at the age of eighteen, and though for some years of his early professional career he had to struggle with poverty and hardships, yet he soon received from Durand, Trumbull, and Dunlap that cordial recognition and encouragement which enabled him to triumph over all difficulties. His tastes in landscape, though equally true to nature with Durand's, were attracted to a different phase of her many-sided glories. Durand was essentially a painter of nature in repose and quiet. The gentle grass covered slopes, the drowsy forests at noon tide, the calm lake whose placid bosom reflects the foliage of the hills, the gently flowing river, the meadows covered with kine, were the subjects in which Durand has always delighted. Cole, on the contrary, preferred to depict the mountains riven by earthquakes, the varied hues of the storm cloud, the fierce torrent and cataract, and the waters lashed into fury by the mighty wind. If he painted the forest, it must be when the Frost King had decked it in its gorgeous parti-colored hues.

Without losing at any time his fondness for nature, his poetic temperament led him

to embody it in those grand allegorical pictures, in which he has combined perfect fidelity to the great truths of nature with a higher and sublimer significance, as in his series of the "Rise, Progress, and Fall of Empire," his beautiful epic of the "Voyage of Life," and his not quite finished group, "The Cross and the World."

Though cut off in his prime, Cole has left a reputation which in some respects has never been surpassed in this country. Thos. Doughty, the third of the trio of our founders of the American School of landscape art. (born in Philadelphia July 19, 1793, and died in New York, July 24, 1856) was not the peer of either Durand or Cole. The influence of the old conventional school which thought nature needed to be improved before she was presentable, and perhaps, too, the lack of that lofty genius which enabled the others to overleap conventional rules, kept him in bondage throughout his career. Still his landscapes possess a large measure of poetic beauty. He did not enter on his profession till he was nearly twenty-eight years of age.

Daniel Huntington, born in New York, Oct. 14, 1816, a pupil of Morse, and Elliott, is one of the most versatile and accomplished of American artists. He has painted, and with eminent success in every case, portraits, historical, allegorical, and *genre* pieces, and landscapes of wonderful beauty. His "Mercy's Dream," "Christiana and her Children," "The Shepherd's Boy," "The Marys at the Sepulchre," "The Good Samaritan," "Ichabod Crane and Katrina Van Tassel," "The Republican Court," "Chocurua Peak," "Sowing the Word," and his numerous portraits of the highest style of art, all give evidence of the great scope of his powers. Mr. Huntington was President of the National Academy from 1862 to 1870.

Charles Loring Elliott, born in Scipio, N. Y., in Dec. 1812, died at Albany, Aug. 25, 1868, was for more than twenty years before his death regarded as the most eminent portrait painter in this country, succeeding almost without any interval to the great reputation of Inman. Some of his male heads have never been surpassed in vigor and thorough soulfulness.

George A. Baker, of New York, is equally distinguished for his heads of women and children. Henry Peters Gray, born in New York in 1819, holds a high position as a

painter of portraits, and of small pictures of *genre* and history. His "Pride of the Village," "Building of the Ship," "Venus and Paris," etc., are admirable. Mr. Gray was President of the Academy 1870-1871. Thomas P. Rossiter, born in Sept. 1818, died in 1871, was a man of rare gifts in art, and had painted many large historical and scriptural pieces of great merit. Arthur F. Tait is particularly happy in pictures of game and sporting life, a branch successfully followed by the late William Ranney. Thos. Hicks, born Oct. 18, 1823, is among the most popular of the present group of portrait painters in New York. He completed in 1865, a large picture of the authors of the United States. Edwin White's great picture of "Washington Resigning his Commission," painted for the legislature of Maryland, is a fair example of this artist's style and class of subjects.

Emanuel Leutze, born in Wurtemberg, May 24, 1816, died in Washington, D. C., July 18, 1868, was, perhaps, the best of our historical painters. From his 15th to his 28th year, he resided in Philadelphia, but then went abroad to study art, and remained eighteen years. He returned to the United States in 1859, and painted many pictures on topics connected with American Revolutionary and later history.

P. F. Rothermel, born July 8, 1817, of Philadelphia, is eminent in historical subjects. The Lambdins, of Philadelphia, father and son, hold a distinguished place in the art, the elder as portrait painter, the latter as painter of poetical and dramatic scenes.

F. O. C. Darley has achieved a world-wide fame, by his designs and book illustrations. Nothing can surpass, in beauty of conception, his charming outline drawings from Irving's "Rip Van Winkle" and "Sleepy Hollow," or his compositions from Judd's novel, "Margaret." He has illustrated a fine edition of Cooper's works in thirty-two volumes, and Dickens' works in fifty-six volumes, as well as numerous minor works. John W. Ehninger has been most successful in the same walk with Darley, besides which he has made many happy *genre* pictures in oil. E. D. E. Green is justly famous for the classic beauty of his female heads; J. T. Peele for his dainty pictures of childhood; Rowse and Colyer for their charming heads in crayon; W. J. Hays for his animal subjects; Eastman Johnson for

his domestic passages of negro and other humble life; Healy and Lang for brilliant portraiture; James Hamilton for marine views; Wenzler and Stone for their female heads, and May in historical subjects.

Among the eminent artists of a somewhat younger class, the first place as a landscape painter must, we think, be given to Frederic E. Church, born at Hartford, May, 1826. A pupil of Thomas Cole, he has all his master's genius, with an equally careful industry in thoroughly finishing his work. His "Niagara Falls" achieved for him the highest reputation, and his "Heart of the Andes," "Cotopaxi," "The Icebergs," and "Rainy Season in the Tropics," have maintained it.

J. F. Cropsey, born in Staten Island, Feb. 18, 1823, has also an excellent reputation, both in Europe and America, as a landscape artist. He resided in England from 1856 to 1863. J. F. Kensett is a little older, having been born in 1818. He was at first a bank note engraver. His first scenes and mountain views are greatly admired. L. R. Mignot, whose tropical atmospheres and vegetation are wonderfully faithful, now resides abroad, as does F. R. Gignoux, a native of France, but resident for nearly thirty years in the United States, and first President of the Brooklyn Art Academy. His "Niagara by Moonlight," and "Niagara in Winter," are both very beautiful. The Hart brothers, William and James M., of Scotch birth, have won high fame by their landscapes. Albert Bierstadt has immortalized himself by his large paintings of Rocky Mountain Scenery, his views in the Yosemite, etc. He has a very high reputation abroad. Our list would be incomplete without the names of Gifford, Casilear, Hubbard, Webber, Gay, Brown, Shattuck, Inness, Colman, and the lamented T. Buchanan Read.

We pass now to a brief glance at the remarkable performance of our young land in the noble art of Sculpture, a performance confessedly surpassed by no modern school.

Sculpture, as the more costly art, and as the less intelligible to the popular eye, of course *followed* painting in its progress among us as elsewhere. The surprise is that it should have followed so speedily and with such grand strides. It is possible that this happy result may have sprung in a measure from the circumstance that our first foreign visitors and instructors in marble art were men of the highest genius, instead of

the third-rate talent only which our early *painters* brought to us. It is seldom amiss to make a good start, and much is saved where there is nothing left to be *unlearned*.

One of our first heralds of the chisel appeared in 1791, when Ceracchi, an eminent Italian sculptor, arrived at Philadelphia. He was scarcely less celebrated as a revolutionist than as an artist, and leaving France when the dangers there grew too thick around him, he marched over to the New World, with a scheme for building us a grand marble monument to Liberty. His project was submitted to Congress, which was then in session, but that body supposed that the public funds could be employed, at the moment, more advantageously in the cause of Liberty, than in honoring her with sculptured shrines. Washington, however, gave his personal assent to the idea, and headed a private subscription, by means of which it was hoped the required thirty thousand dollars could be procured. Not an inch, though, of the proposed hundred feet of stone ever rose from the ground. Instead of the monument, the sculptor employed his chisel upon busts; and, among others, executed fine portraits of the commander-in-chief, of Alexander Hamilton, of Thomas Jefferson, Geo. Clinton, John Jay, and Paul Jones.

On returning to France, Ceracchi's red republicanism reappeared in a madder form than ever, and he plotted to take the hated life of Napoleon, then first consul, even in the sanctity of his own studio, and while he should be sitting for his bust. He was afterward guillotined on a charge of complicity in the famous scheme of the "infernal machine."

Yet earlier than the time of Ceracchi's residence in the United States, Houdon, a celebrated French sculptor, was invited to visit this country for the express purpose of perpetuating in marble the form and features of Washington. The result of his visit was the full-length statue which now adorns the vestibule of the Capitol at Richmond, in Virginia. The sculptor's legend on this work reads thus: "*Fait par Houdon, Citoyen Français, 1788.*" The Father of his country is here represented of life size, and in the military style of the Revolution. The figure stands, resting on the right foot, having the left somewhat advanced, with the knee bent. The left hand rests on a bundle of fasces, on which hang a military cloak and a small sword, a plough leaning near.

Another noble statue of Washington, by Canova, adorned the Capitol of North Carolina, at Raleigh, until that edifice was unhappily destroyed, and the statue with it, by fire, in 1831.

Of our native sculptors, perhaps the first who gave indications of talent above the humblest mediocrity, was John Frasee, born in Rockaway, in New Jersey, July 18th, 1790. A bust which he executed in 1824 of John Wells, now in Grace Church, in New York, was, says Dunlap in his "Arts of Design," the first portrait in marble ever attempted in the United States. Ceracchi's works were probably only modelled here, and were afterward put into stone at home. Frasee made excellent busts of Chief Justice Marshall, of Daniel Webster, and others. "He had advanced," adds Dunlap in 1834, "to a perfection which leaves him without a rival at present in this country." To those who know any thing of our sculptors of *this* day we hardly need say, that Dunlap lived too long ago to witness the real beginning of its brilliant history, and that the talent of Frasee, excellent as it was, did not even indicate the high rank the art now holds.

Shobal Vail Clevenger, who was born at Middleton, Ohio, in 1812, and died at sea in 1843, left behind him admirable busts of Webster, Clay, Allston, Van Buren, and others. His early death interrupted a progress which might have extended far toward the point which our sculptors have since reached.

In the year 1805, on the 6th of September, Horatio Greenough was born in Boston, to fill a distinguished place in the annals of American sculpture. He received his earliest instruction from a resident French artist named Binon, and at the age of twenty went abroad. After modelling busts of John Quincy Adams, Chief Justice Marshall, and many others, he executed, at the order of Fenimore Cooper, the novelist, his Chanting Cherubs, which was the first original group from the chisel of an American artist. This work was made in Florence, where he had permanently established his studio at this time. In 1831 he went to Paris to model the bust of Lafayette, and thenceforward received liberal commissions, especially from his countrymen abroad.

Through the influence of his generous friend, Cooper, he received a commission from Congress for the colossal statue of Washington, which now stands so grandly on the great lawn opposite the east front of

the national Capitol. This work was completed in 1843, after many years of industrious toil. Among others of Greenough's works at this period, were the *Medora*, commissioned by Mr. Robert Gilmor, of Baltimore; the *Venus Victrix*, in the Boston Athenæum; and the *Angel Abdiel*. In 1856 he returned to the United States to superintend the placing at Washington of his group of the *Rescue*, symbolizing the triumph of civilization, which he had executed in fulfilment of an order from Congress. It is supposed that the vexatious delays in the arrival of this work from Italy, together with the hurly-burly of American life, to which his long residence abroad had unaccustomed him, contributed to induce the attack of brain fever, from the effects of which he died, December 18th, 1852.

Greenough was educated at Harvard, and was a man of elegant attainments and accomplished manners. He was engaged in the delivery of a course of art lectures in Boston at the time of his last illness. An interesting memorial of Greenough was published by the poet Tuckerman in 1853.

The first general and popular acknowledgment, at home and abroad, of our success in sculpture, was won for us by the genius of Hiram Powers, and dated from the time of the exhibition of his *Greek Slave*. Not that this is by any means the best performance our artists have reached—for other men have followed with yet greater works; and among these others, one, of whom we shall speak, who has cast off the conventionalities of old art, and has, upon his own native soil, not that of Europe, gone beyond mere classic beauty, to the higher attainment of individual and national character and truth. Yet, as we have said, it was from the popular success of this statue of the *Greek Slave* that the world picked up and recognized the fact of the genius of American sculptors.

Powers is a native of Vermont; but, like most of our men of marble, resides and works abroad. He established himself long years ago in Florence, since which time we do not know that he has even visited his native land. He is an industrious worker, and has made innumerable busts, in addition to his more ambitious ventures into the field of poetry and the imagination. It is, indeed, in portraiture that his strength lies—with a temperament more practical than fanciful, and with a sympathy more with

the real than with the ideal. His colossal figure of *Eve*, and his full-length statue of *Calhoun*, are preserved in South Carolina.

In the lamented Crawford, who was born in New York, March 22d, 1814, and who died in London, October 10th, 1857, we possessed a man of stronger and nobler grasp than any of his predecessors; a man, who not only *could* have done great things had he lived, but who did them even without living to the full years of ripe experience. Crawford was a poor boy, and began his art life in the humble occupation of a wood-carver. At the age of nineteen he was promoted to a place in the studio of Frascce and Launitz, in New York; and, when about twenty-one, he went to Rome, and became a pupil of the Danish sculptor Thorwaldsen. Here he toiled so unremittingly that he is said to have modelled no fewer than seventeen busts in the space of ten weeks, besides copying, in marble, the figure of Demosthenes in the Vatican. In 1839, when in his twenty-fifth year, he exhibited his *Orpheus*, with the warm congratulations of his master, Thorwaldsen, and other sculptors, and with the hearty approval of the public. From that period his fame continued to increase up to the hour of his untimely death. The *Orpheus*—which is now in the Athenæum in Boston—was followed by numerous admirable subjects from classical and scriptural history. Among his greater and later works, was the remarkable statue, in bronze, of *Beethoven*, executed for the Boston Music Hall; and the completion of which, at the foundry in Munich, was celebrated by a musical festival, at which the royal family of Bavaria, and a grand concourse of people, assisted. Afterward came the equestrian statue of Washington, which now adorns the Capitol hill at Richmond; where it was placed by the patriotism and liberality of the people of Virginia. This great work was cast in bronze in Munich, and sent home in 1857. Its pedestal rests upon a star-shaped elevation, with six points, upon which statues of Jefferson, Henry, Lee, and other illustrious sons of Virginia are to be placed. He executed orders from Congress for various works for the new Capitol, some of the most successful of which were his designs for the pediment and the great bronze doors. His grandest effort is, perhaps, the model for the colossal statue of the *Genius of America*, which is to be cast in bronze, and placed upon the pinnacle of the

Capitol dome. This statue represents a female figure, fully draped, and posed with marvellous grace and dignity. During his brief career, Crawford finished more than sixty works, many of them of the grand size; besides which, he left nearly as many sketches in plaster, and numerous designs, which his assistants are to complete. In 1844, he married Miss Louisa Ward, daughter of the late Samuel Ward, of New York. Soon after his return from his last visit to his native land, in 1856, he was afflicted with a cancerous tumor on the brain, from the effects of which he died, after many months of acute suffering, borne with heroic patience.

Henry Kirke Brown, another of the most eminent of our American sculptors, was born at Leyden, Massachusetts, in 1814. He began the study of portrait painting in Boston, when eighteen years of age; and afterward he became a railroad engineer in Illinois, much to the injury of his health, and at length repaired to Italy to pursue the grave art of the statuary. Among his more famous works, are the well-known marbles of Hope; the Pleiades; the Four Seasons; the bronze statue of De Witt Clinton at Greenwood Cemetery, and the noble equestrian statue of Washington, which stands in Union square in the city of New York. Most, if not all of these works, were executed in Brooklyn, New York; though, of late years, the artist has established himself in a pleasant cottage at Newburgh, on the Hudson. Brown's Washington was the first statue ever cast in bronze in this country.

Palmer, who is, perhaps, the most popular of American sculptors at the present day, was born in the interior of the state of New York. His noble character—no less personal than professional—is seen in all the interesting incidents of his career, from the humblest boyhood to his present high position, social and artistic. In his younger days he toiled hard at the carpenter's craft; afterward he rose to the dignity of a carver in wood, of models and moulds for stove and other iron castings; and at length he became a cutter of cameos. He was a married man, with a young family growing up around him, before he finally made that venture in marble which has brought such high honor to himself and his country. His works are marked with singular simplicity, truth, and naturalness of treatment,

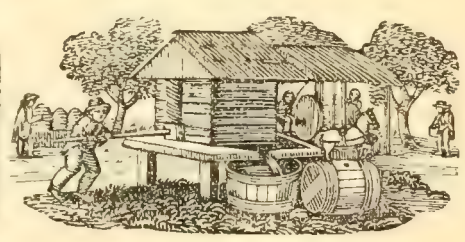
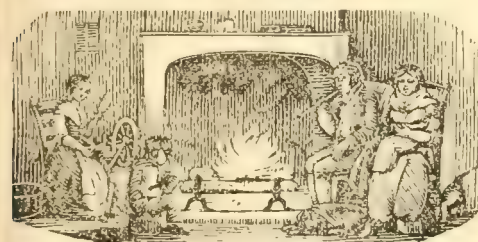
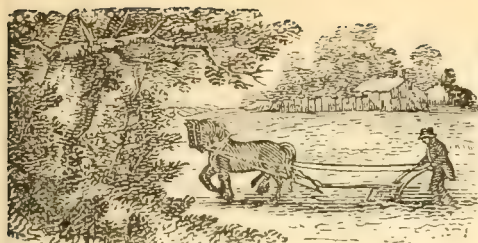
and with a finish and delicacy of execution rarely obtained in obdurate stone. Among his chief and best known productions, are the full-length, life-like figures of the Indian Girl, and the White Captive; the Moses, and many beautiful bas-reliefs and female heads, both portrait and ideal. An exhibition of his collected works was made a few years ago, with great advantage to his own fame and fortune, and to the public pleasure and profit.

Launt Thompson, a young pupil of the eminent sculptor above named, is pursuing his art in New York with a success which promises the most enviable results.

Clark Mills, a self-educated man, in the proper sense of the phrase, is known by his popular equestrian statues of Jackson and Washington, executed by the order of Congress, for the embellishment of the national Capitol.

Harriet Hosmer, of Watertown, Mass., has achieved a fair fame in this difficult field of art. The approval which followed her first original work—a bust of Hesper—induced her father to send her to Rome, where she has resided most of the time since 1852. She began her studies in the eternal city, as a pupil of Gibson, in 1852. Her first works abroad were the busts of Daphne and Medusa, and a statue of Enone. Afterward came the well-known reclining figure of Beatrice Cenci; and, in 1855, the charming statue of Puck, and a pendant thereto, entitled *Will-o'-the-Wisp*. In 1859, she completed her statue of Zenobia in Chains.

Of our other sculptors of great promise, four have passed away within a few years: Benjamin Paul Akers who died May 21, 1861; E. S. Bartholomew, at Naples, May 2, 1858; and more recently Robert Ball Hughes, an Englishman by birth, who died in Boston, March 5, 1868, and Robert E. Launitz, who died Dec. 2, 1870. Those most prominent beside those already named, are Randolph Rogers, John Q. A. Ward, now vice-president of the National Academy, William W. Story, Thomas Ball, John Rogers, whose groups have done so much to popularize sculpture, Ives, Stone, Mosier, Albert de Groot, and Gould, a young countryman of ours now occupying a studio in Florence. Mr. Gould has recently sent to this country an ideal statue "*The West Wind*," which for its perfect embodiment of a poetic conception has no superior in modern sculpture. Among others, a



The above engravings, representing the Seasons, are from the *Farmer's Almanac*, showing the Anderson style of engraving; the opposite page, engraved from sketches about Newport, R. I. by A. H. Jocelyn, illustrates the improvement in the art.

young woman of color, Edmonia Lewis, are still climbing the heights that lead to fame.

The love of pictures, so general among our people of all grades, has been greatly fostered and cultivated, of late years, by the universal diffusion of engravings. Besides the best of this class of works, more accessible examples, in the form of book illustrations, and especially in illustrated magazines and newspapers, have been scattered, through a cheap press, broadcast over the land, and have penetrated its remotest corners, doing the labors of the missionary in the great cause of art. It is true that these heralds—the pictorial papers, at least—are not always the best possible teachers; yet have they cleared the way for greater things to follow, and it is gratifying to know that they are themselves every day reaching toward a higher standard. It would, indeed, be quite beyond the power of our mathematics, to cipher out the good effect upon the art progress of the nation, of even one of our best pictorial magazines, with the immense audience which they are wont to address; such a magazine, for example, as that of the Harpers—read, or at least seen, every month, by millions of people.

This grand aggregate of the good influence of the graver, is gained through the agency, not of the ambitious steel-plate, but the humble wood-cut. The art of working on wood—which has thus of late become the chief medium of the engraver, and has almost superseded all other mediums—has, though an old art, so greatly improved during the eighty years life of our republic, that it may fairly be said to have grown up with it, and in a great degree *from* it.

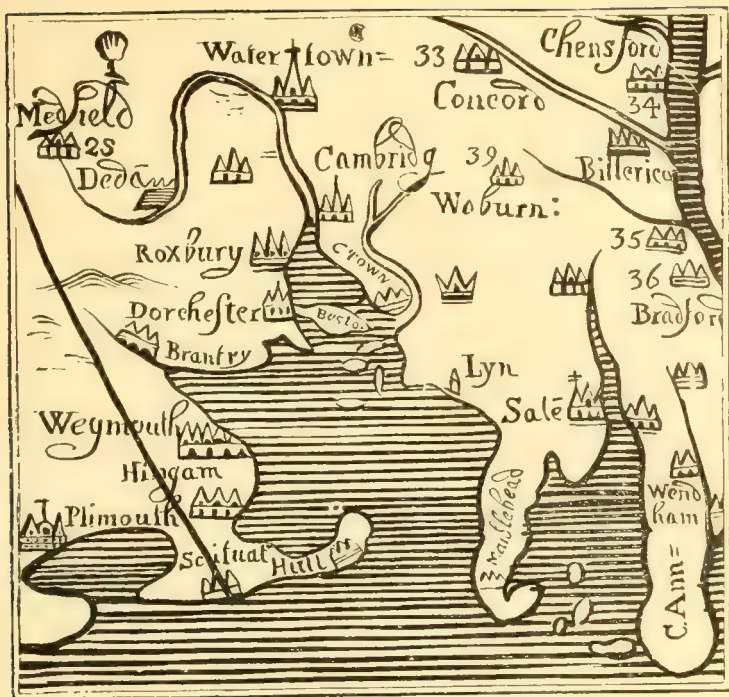
The general demand among us for cheap art, and the general ability to buy, at least, such cheap art, obviously required the wood-cut; and so the wood-cut—which had kept its humble place from a period even far beyond the invention of types—was brought from its obscurity, and made—in our own hands, as much as in those of any people—to fill its present exalted office.

The art was, really, almost reinvented in America, and soon after the great Revolution, when Dr. Anderson, in 1794, left his *materia medica*, and set up in New York as a wood-engraver. Anderson's first considerable performance was the repetition, in a work called the "Looking-Glass," of some cuts by Bewick. Some of these pictures he executed on type metal, and only a portion

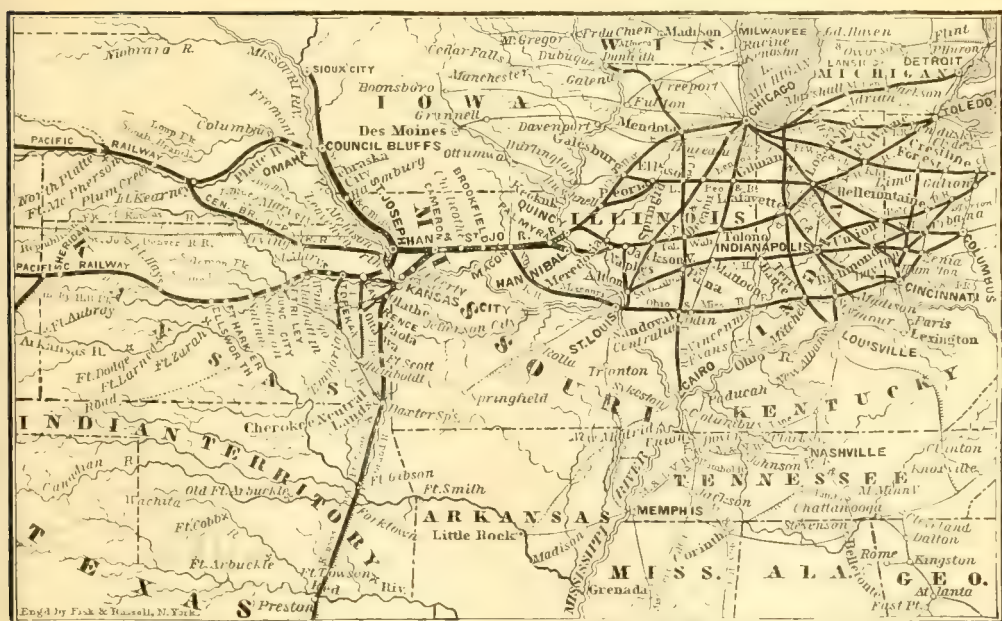
of them on the wood-block. For these he had to invent his own tools, and then manufacture them. He continued to improve, and all through his professional career he contributed greatly to develop the resources of the art, and to put it upon the track of its present mature power. In 1812, the art was introduced and successfully practised in Boston by Abel Brown, and in Philadelphia by William Mason.

About the year 1826, Mr. Adams entered the profession, and by his industry and skill gave it a great impetus toward the perfection to which it has since been brought. The innumerable illustrations which he produced in his superb pictorial edition of the Bible, published by the Harpers, called forth all the talent which the country possessed in this direction, and exercised it to yet greater excellence. This great work served, also, no doubt, to promote the popular appreciation of the art, now so universally manifested in the demand for illustrated books and pictorial papers of all kinds. From the time of Mr. Adams, the number of our engravers on wood has steadily and rapidly increased; and so, too, has the quality of their work, until the present day shows us pictures on wood which are, in many respects—as in delicacy of finish, softness of texture, and vigor of expression—quite equal, if not superior to the best examples of work on copper or steel. The greater cheapness of the wood-block; its capacity of use, in printing *with* the type (which metal plates do not possess); and the ease with which it may be duplicated by stereotyping or by electrotyping—have caused it to supersede copper and steel-plates in a great measure, except for very large and costly subjects, and for bank note engraving. The invention, in recent times, of Lowry's "ruling machine;" of improved methods of printing, as in the process called "overlaying," by means of which the nearer parts of the picture are made to receive a stronger pressure than the more distant portions; and various mechanical aids—have contributed to the present wonderful perfection of the art among us. The country now possesses a host of excellent wood engravers, who find full and remunerative employment.

For the finer class of wood-engravings, box-wood (imported chiefly from Germany) is used; while, for coarser and larger work, that of the pear-tree will answer, and some-



FIRST MAP ENGRAVED IN THE UNITED STATES IN RAISED LETTERS



MAP OF THE PRESENT TIME IN RAISED LETTERS.



times even that of the apple-tree, beech, and even mahogany and pine. The wood is cut across the ends of the fibre, of the thickness of type; and after being smoothly planed, a thin covering of white is rubbed over the surface; after which the drawing to be engraved is made upon it with a lead pencil, or with India-ink, or both combined. The block is then cut away with the graver, in such manner as to leave the lines of the drawing all in *relief*, like type. On copper or steel, on the contrary, the drawing is *sunk* into the plate, and is necessarily printed with greater slowness and care, and at a greater cost. In engravings printed in colors, a separate block is made for each tint.

Copper-plate engraving is an art as old, almost, as xylography or wood-cutting. A picture upon this metal is preserved in Germany of as ancient a date as 1461. Instead of the simple wooden blocks of other days, our cotton manufacturers now print their calicoes from copper plates of cylindrical form, by which improvement the fabrics are made infinitely more beautiful and greatly cheaper. Most of the larger print-works employ skilful artists and engravers to produce their designs, paying them large salaries for their labors. In some establishments thousands of dollars are thus profitably expended each year. Copper-plate engraving, after reaching the highest degree of excellence, both at home and abroad, has, within the present century, given way in a great measure to the superior capacity of the steel plate, a capacity revealed to the world and developed in the highest degree by Jacob Perkins, of Newburyport, in Massachusetts. Mr. Perkins, who began his experiments about 1805, may, indeed, almost be said to have invented steel engraving, since the metal had been used only once before his time, in an English print in Smith's "Topographical Illustrations of Westminster." Mr. Perkins discovered the present invaluable processes by which the steel plate is so hardened after being engraved, that by the pressure upon it of other soft plates, the picture can be transferred in relief and again repeated so as to duplicate the work to any extent. The first impression in *relief*, from which duplicates of the original engraving are made, is taken upon a soft steel cylinder by repeated rollings over the hardened plate. By this process any bank note vignettes can be transferred, in *combination*, at will, from the separate original plates to the steel cylinder, and

from that to other plates for the printer. The product is thus greatly cheapened, inasmuch as all the pictures, the central vignette, the end scene or portrait, and the bottom or tail piece, usually put upon a bank note, can be furnished for the cost of a special engraving of one of them. Mr. Perkins' system is employed throughout England and the continent of Europe, no less than all over the United States. By it the art of bank note engraving has been so perfected among us that only the highest skill and the costliest machinery can now produce successful counterfeits. Nothing remained but to insure the bank note against the wonderful power of the art of photography, and this security our engravers and paper makers have provided. In 1858-9 the principal bank note engravers of the country formed themselves into two associations, the American and the National Bank Note Companies, and in the early years of the National Banks, they prepared for the government the elaborate engravings of the National Bank Notes, as well as the simpler plates of the Legal Tender Notes. These notes and National Bank notes having now become the only bank circulation of the country, they are prepared by the government. Among the successful American steel engravers of bank notes and other works, are Durand, Smillie, Cheney, Sartain, Danforth, Dick, Casilear, and Alfred Jones. Engraving on copper or steel is practiced in its most simple form, called line engraving, by covering the face of the polished metal with a thin surface of melted white wax; on this the sketch is transferred by laying, face down, a tracing of the design in black lead pencil upon the wax, and subjecting it to a heavy pressure; the lines are then seen distinctly upon the wax when the paper is removed. The workman then with a fine graver makes the lines through upon the metal; after which the wax is melted off and the engraver proceeds to complete the work by cutting the lines to the proper depth and shade. The graver, when in use, is pressed forward, cutting a furrow and raising burrs on each side. The burr, pushed up by the graver in its progress, is removed by the scraper. Lines are softened by rubbing over with a smoothly pointed burnisher. In some instances the burrs made by the finest etching needles being allowed to remain, produce a pleasing effect, seen in some of Rembrandt's engravings. The parallel lines that are sometimes required in series are

cut by a ruling machine. The fainter shades, too delicate for the graver, are scratched in with a needle.

In the stippling or dotted style, the effect is produced by dots made in curved lines, with the graver. The more closely the dots are grouped together, the darker the shade, and the whole effect is more like painting than the line engraving. In the shadows of the limbs of the human figure it is much used, and sometimes in portraits the line and stipple are combined with good effect.

The style called etching is practised upon other metals, also upon glass. By this process the coating of wax is formed of white wax, Burgundy pitch, and asphaltum, and is applied in silk bags, through which the composition oozes. When the plate is covered it is held over a smoking lamp until the wax is covered with lamp-black. The lead pencil design is then laid upon this lamp-black and pressed. The lines are then drawn through the wax, and nitric acid with four parts water is poured upon the plate. This remains until the fainter portions of the sketch are corroded. The acid is then poured off and the plate washed with water. An application of lamp-black and turpentine, called stopping, is applied with a camel's hair brush to those portions sufficiently corroded; a reapplication of the acid eats deeper into those parts that require deeper lines. This process of stopping is repeated until the work is complete. Being then cleaned of the wax, those portions of the plate that require it are gone over with the graver, and not unfrequently the shades are stippled.

Aquatinta is a French invention of 1662, and takes its name from the resemblance it has to water colors on India-ink drawings. After the design is etched in outline and the wax removed, a solution of Burgundy pitch in alcohol is poured over the plate as it lies in an inclined position. The alcohol evaporating, the pitch remains. The design is then drawn with a gummy syrup called the bursting-ground, which is applied only wherever a shade is wanted. The whole is then covered with a turpentine varnish; water being left on it for fifteen minutes, the bursting-ground cracks open and exposes the copper. The etching process is then pursued. Sometimes colors are applied and printed from the plate; but when there are different tints, it is customary to use a distinct plate for each one.

The mezzotinto, or half-painted style, was introduced into England by Prince Rupert.

The invention has been ascribed to Sir Christopher Wren. The plate is roughed up by running over its surface little toothed wheels of different degrees of fineness, called cradles, which by a rocking motion are caused to raise little burrs, pointing in different directions. The whole plate being thus made rough, the burrs are rubbed off with scrapers, wherever light shades are required, and the shades are deepened by increasing the burrs. The effect is fine where dark grounds are desired. This method combined with etching, produces an improved style. Some mezzotints are now prepared for the trade by a machine. The prints wear much better on steel than on copper.

Admirable examples of these branches of the art may be seen in the superb landscape works of Smillie, especially those from the four pictures of Cole's *Voyage of Life*, in Durand's works after Vanderlyn's, in our many beautiful illustrated books, in the publications of the late American Art Union, and, as already intimated, in the dainty vignettes which embellish our bank notes.

In the art of die sinking—a process conducted in a similar manner to that already described of the transfer in relief of the impression from a hardened plate or plug of steel to a soft plate, and from that again, when hardened, to yet another—many admirable works have been produced. Excellent examples may be seen in the medals of Allston, Stuart, and other subjects executed for the American Art Union by the late C. C. Wright.

By the assistance of the electrotype process, the work of the engraver is now repeated, in as many copies as may be desired, each of the copper transcripts thus produced being an absolute duplicate of the original plate or block. It is these electrotyped copies which are now used by the printer, the same picture sometimes on several presses at once, while the original wood block is preserved untouched, except to form the mould for other copies in metal when they may be required. The effect of this power of perfect and inexpensive repetition of engraved blocks has been to reduce the cost of pictorial illustrations to a point within the compass of the most unpretending purse, and thus to send good examples of the engraver's art to the remotest and humblest corners of the land.

What may be the consequences of the many processes, now more or less perfected,

for the mechanical production of engraving by the aid of photography, it is hardly possible to imagine: not other than advantageous, however, even to the engravers themselves, since their field of labor will be higher, if not broader, when their pictures shall be, as they promise to be, not only drawn for them on their plates and blocks by photography, but even etched and engraved besides.

In the art of lithography, or drawing upon stone, a steady advance may be witnessed; though our works of this class cannot yet claim comparison with those of the continent of Europe.

The introduction of the daguerreotype, the perfection to which the art has been brought in the skilful hands of American operators, and the immense extent to which it is used among us, (apart from its share in the work of other arts), have had, no doubt, a most wonderful influence upon our art progress. Furnishing pictures which are, through their cheapness, accessible to all classes, it has worked, like the engraving, as an elementary instructor, while its truthfulness has been a constant lesson to the artist himself. Better pictures have, unquestionably, been painted through the hints of the daguerreotype and photograph; and many people who, but for them would never have dreamed of pictures, have become intelligent lovers and liberal patrons of the arts.

The art of color printing is not very new, but it is only within a few years past that it has been brought to such perfection by the processes of chromo-lithography as to be able to reproduce paintings, within certain limitations of size and color, so exactly as to make it difficult to distinguish the copies from the original painting. The process has other limitations even than these; it requires slow and careful, almost painful manipulation sometimes for months, and the printer must be himself an artist, at least in his taste and his knowledge and skill in the blending of colors. He will even, at the best, meet with frequent failures; but notwithstanding all these limitations, chromo-lithography, as now practiced by the best artists, is a boon to the world second only to the sun pictures. It has made it possible for persons of small means and but just developing taste for art, to obtain gems of art, every way superior to the average copies of celebrated pictures, and thus awaken a love for the really beau-

tiful which will grow until it makes the humble purchaser in time, a munificent patron of art. The process as now practised by Messrs. Colton, Zahm and Roberts, L. Prang & Co., E. Ketterlinus & Co., and others, requires a very searching and accurate analysis of the colors and combinations of color which will produce the required effect of the picture selected for copying, and then an accurate copy of the picture in outline having been made on stone it is printed first with a single uniform tint. Then by successive printings each time from a different stone, the colors and combinations are laid on, the utmost care being taken to make the register perfect each time so as to give the perfect copy of the original without blurring or commingling the colors unduly. Between each printing ample time must be given for the pigments to dry and harden. After all the printings are done, the picture is varnished and then embossed or subjected to pressure on a grained surface of stone or metal, by which process the glossy lights are broken, the hard outlines softened, and the appearance of canvas is given to it. If all these steps have been properly taken, and guided by real artistic taste and knowledge, the picture once mounted and framed will have all the effect of the original. The cost of production, which is very considerable, is greatly reduced on each copy, from the fact that five hundred, one thousand, or more, can be printed from the same plates, and though there will be some defective copies, yet with proper care, the greater part will be perfect.

We must not, in ever so cursory a glance at the history of the arts, forget the service of our academies and schools of painting, little as some affect to think of art academies—so far, at least, as their *honorary* character is concerned.

The first attempt to found an institution of this nature in the United States, was made in Philadelphia, in 1791, by Charles Wilson Peale, the father of the painter, Rembrandt Peale. The elder Peale was a very energetic laborer in the cause of art, all through his long life. This first attempt of his to found an academy, was seconded by the Italian sculptor Ceracchi, who was in the country at the time. The attempt failed, however, from some cause or other, and a second and rather more fortunate venture was made in 1794, when the Columbianum

was established. This society lived a year, held one exhibition, and was forgotten.

In 1802, some art-loving citizens of New York, headed by Edward Livingston, founded the New York, afterward the American Academy of Fine Arts. There were so few artists in this society, and the governing influence was so little of a professional character, that it was an academy of art only in name, and quite failed in its office of an academy. The necessary result was an inefficient life, until it was, in due time, superseded by a better organized establishment. This result followed in 1826, in the institution of the present National Academy of Design.

The National Academy, thus founded by Morse, and his brother artists of the period, has steadily advanced to this day in position and usefulness, and now numbers among its academicians and associates nearly all the leading painters of the land. Its annual exhibitions have been prepared, without interruption, from 1826 until now, with a catalogue of works extended gradually from less than two hundred, to over eight hundred, and with an aggregate of receipts from less than nothing up to six or seven thousand dollars annually. The academy has always supported free (evening) schools for the study of the antique statuary, and the living models; schools, to which any student has access, when coming with the required preparatory knowledge of the use of the crayon. Membership in the academy, except in the grade of "student," is awarded only to professional artists, and then by ballot, as a mark of honorary distinction. The progress of art in America during the last forty or fifty years cannot be better seen than in the continued growth of the National Academy, and in its present large and varied exhibitions as compared with those of days gone by. An art academy was founded in Brooklyn, N. Y., in 1867, which is in a very flourishing condition.

The Pennsylvania Academy of Fine Arts in Philadelphia is doing a good work, though it is not so fully an association of artists only as is the National Academy at New York.

Conducted in part by laymen, it labors under some of the disadvantages of the old superseded American Academy. It was founded as early as 1807, and is now a flourishing and most useful institution, keeping a valuable permanent gallery always open to the public view, and providing besides an annual display of the current productions of our artists. It possesses also a fine collection of casts from the antique, gratuitously accessible to all students.

The art gallery of the Athenæum in Boston, serves, in a measure, the purposes of an academy in that city. Of late years Academies of Art have sprung up in some form, and with more or less success, in many other of our chief cities, as in Baltimore, Charleston, Brooklyn, Chicago, St. Louis, Cincinnati, and elsewhere, giving us a fair promise of picture galleries and facilities for art study, as general and as liberal as our wants demand.

Besides these institutions for the use of the profession itself, there is happily a rapid extension throughout the Union of drawing schools for all classes of the population. Professorships of drawing are being introduced into our universities and colleges, and a higher standard is being everywhere set up in our seminaries of all grades. Schools of Design for women are springing up in our larger cities, and such an institution has been in successful operation in connection with the Cooper Union of New York for thirteen or fourteen years past, under the highest promise of successful result. When the principles of art become universally known to us, as we have good cause to believe they soon will be, we shall realize the fact not only in the increased excellence and fame of our pictures and our sculptures, but in the higher beauty, utility, and value of our manufactures and fabrics of all kinds, from the rarest luxury to the simplest article of necessary use. In another and less material sense we shall feel it and enjoy it, in breathing the air of a more refined and more beautiful social and national life.



Henry Barnard

EDUCATION AND EDUCATIONAL INSTITUTIONS.

CHAPTER I.

EDUCATIONAL DEVELOPMENT IN THE COLONIAL PERIOD.

INTRODUCTION.

THE origin, nomenclature, and early peculiarities of the systems, institutions, and methods of instruction adopted in the original colonies, which now constitute a portion of the United States of America, will be found in the educational institutions and practices of the countries from which these colonies were settled—modified by the education, character, motives of emigration, and necessities of the settlers themselves.

The earliest effort to establish an educational institution in the English dominions in America, was made under the auspices of King James I, and by contributions of members of the Church of England from 1618 to 1623. In a letter addressed to the Archbishops, he authorizes them to invite the members of the Church throughout the kingdom to assist "those undertakers of that Plantation [Virginia], with the erecting of some churches and schools for the education of the children of those barbarians" [the Aborigines] and of the colonists. Under these instructions, a sum of £1500 was collected for the erection of a building for a college at Henrico—a town whose foundations, or site even, cannot now be certainly determined, but which according to the best authorities was situated near Varina on Cox's Island, about fifty miles above Jamestown. Authority was given by the Company to the Governor to set apart 10,000 acres of land for the support of the college, and one hundred colonists were sent from England to occupy and cultivate the same, who were to receive a moiety of the produce as the profit of their labor, and to pay the other moiety toward the maintenance of the college. In 1620, George Thorpe was sent out as superintendent, and 300 acres of land was set apart for his sustenance. Other donations

and legacies were made for the endowment of this institution of learning.

In 1619, the Governor for the time being was instructed by the company to see "that each town, borough, and hundred procured by just means a certain number of their children to be brought up in the first elements of literature; that the most towardly of them should be fitted for college, in the building which they purposed to proceed as soon as any profit arose from the estate appropriated to that use; and they earnestly required their help in that pious and important work." In 1621, Rev. Mr. Copeland, chaplain of the Royal James, on her arrival from the East Indies, prevailed on the ship's company to subscribe £100 toward a "free schoole" in the colony of Virginia, and collected other donations in money and books for the same purpose. The school was located in Charles City, as being most central for the colony, and was called the "*East India School*." The company allotted one thousand acres of land, with five servants and an overseer, for the maintenance of the master and usher. The inhabitants made a contribution of £1500 to build a house, for which workmen were sent out in 1622.

The "college" and "free school" thus projected and partially endowed were in the style of the "college" and "free school" and the "free grammar school" of England, and were intended to be of the same character as the college afterward established at Cambridge, and the institution for which "the richer inhabitants" of Boston in 1636 subscribed toward "the maintenance of a free schoolmaster," and the same as, according to Governor Winthrop, in his journal, was erected in Roxbury in 1645, and other towns, and for which every inhabitant bound some house or land for a yearly allowance forever, and many benevolently disposed persons left legacies in their last wills, and the towns made "an allowance out of the common stock," or set apart a portion of land

"to be improved forever, for the maintenance of a free school forever."

The same leading idea can be traced in the educational policy of the Dutch West India Company—which bound itself, in receiving its charter of colonization, "to maintain good and fit preachers, schoolmasters, and comforters of the sick." The company recognized the authority of the established Church of Holland, and the establishment of schools and the appointment of schoolmasters rested conjointly with the company and the classis (ecclesiastical authorities) of Amsterdam. When the company granted a special "Charter of Freedom and Exemptions" to the "Patroons," for the purpose of agricultural colonization, they were not only to satisfy the Indians for the lands upon which they should settle, but were to make prompt provision for the support of a minister and schoolmaster, that thus the service of God and zeal for religion might not grow cold, and be neglected among them. In 1633, in the enumeration of the company's officials at Manhattan, Adam Roelandsen is mentioned as the schoolmaster, and that school, it is claimed, is still in existence in connection with the Reformed Dutch Church of New York. In the projected settlement at New Amstel on the Delaware, the first settlers were encouraged to proceed by certain conditions, one of which was that the city of Amsterdam should send thither "a proper person for a schoolmaster;" and we find among the colonists who embarked, "Evert Pietersen, who had been approved, after examination before the classis, as schoolmaster." In these early efforts to establish schools, we trace the educational policy of the Reformed Church of Holland as indicated by the synod of Wesel in 1568, and matured at the synod of Dort in 1618, by which the training of Christian youth was to be provided for—"I. *In the house, by parents.* II. *In the schools, by schoolmasters.* III. *In the churches, by ministers, elders, and the catechists especially appointed for this purpose.*" Owing in part to the commercial purposes entertained by the companies having charge of the colonization of New York, Virginia, and some other portions of the country, and to the educational and religious institutions of the colonists being not so much a matter of domestic as of foreign policy, these institutions never commanded the regular and

constant attention of the local authorities, or of the settlers themselves.

The outline and most of the essential features of the system of common schools now in operation in the New England states, and the states which have since avowedly adopted the same policy, will be found in the practice of the first settlers of the several towns which composed the original colonies of Massachusetts, Connecticut, and New Haven. The first law on the subject did but little more than declare the motive, and make more widely obligatory the practice which already existed in the several neighborhoods and towns, which had grown up out of the education of these colonists at home, and the circumstances in which they were placed. They did not come here as isolated individuals, drawn together from widely separated homes, entertaining broad differences of opinion on all matters of civil and religious concernment, and kept together by the necessity of self-defence in the eager prosecution of some temporary but profitable adventure. They came after God had set them in families, and they brought with them the best pledges of good behavior, in the relations which father and mother, husband and wife, parents and children, neighbors and friends, establish. They came with a foregone conclusion of permanence, and with all the elements of the social state combined in vigorous activity—every man expecting to find or make occupation in the way in which he had been already trained. They came with earnest religious convictions, made more earnest by the trials of persecution; and the enjoyment of these convictions was a leading motive in their emigration hither. The fundamental articles of their religious creed, that the Bible was the only authoritative expression of the divine will, and that every man was able to judge for himself in its interpretation, made schools necessary, to bring all persons "to a knowledge of the Scriptures," and an understanding "of the main grounds and principles of the Christian religion necessary to salvation." The constitution of civil government adopted by them from the outset, which declared all civil officers elective, and gave to every inhabitant who would take the oath of allegiance the right to vote and to be voted for, and which practically converted political society into a partnership, in which each member had the right to bind the whole firm, made universal education

identical with self-preservation. But aside from these considerations, the natural and acknowledged leaders in this enterprise—the men who, by their religious character, wealth, social position, and previous experience in conducting large business operations, commanded public confidence in church and commonwealth, were educated men—as highly and thoroughly educated as they could be at the best endowed free and grammar schools in England at that period; and not a few of them had enjoyed the advantages of her great universities. These men would naturally seek for their own children the best opportunities of education which could be provided; and it is the crowning glory of these men, that, instead of sending their own children back to England to be educated in grammar schools and colleges, these institutions were established here amid the stumps of the primeval forests; that, instead of setting up “family schools” and “select schools” for the ministers’ sons and magistrates’ sons, the ministers and magistrates were found, not only in town-meeting, pleading for an allowance out of the common treasury for the support of a public or common school, and in some instances for a “free school,” but among the families, entreating parents of all classes to send their children to the same school with their own. All this was done in advance of any legislation on the subject, as will be seen from the following facts gleaned from the early records of several of the towns first planted.

TOWN ACTION IN BEHALF OF SCHOOLS.

The earliest records of most of the towns of New England are either obliterated or lost, but among the oldest entries which can now be recovered, the school is mentioned not as a new thing, but as one of the established interests of society, to be looked after and provided for as much as roads and bridges and protection from the Indians. In the first book of records of the town of Boston, under date of April 13, 1634, after providing by ordinance for the keeping of the cattle by “brother Cheesbrough,” “it was then generally agreed upon that our brother Philemon Purmont shall be entreated to become schoolmaster for the teaching and nurturing of children with us.” This was doubtless an elementary school, for in 1636 we find a subscription entered on the records of the town “by the richer

inhabitants,” “for the maintenance of a free schoolmaster, for the youth with us—Mr. Daniel Maude being now also chosen thereunto.” Mr. Maude was a clergyman, a title at that day and in that community which was evidence of his being an educated man. This “free school” was, in the opinion of the writer, not necessarily a school of gratuitous instruction for all, but an endowed school of a higher grade, of the class of the English grammar school, in which many of the first settlers of New England had received their own education at home. Toward the maintenance of this school, the town, in 1642, in advance of any legislation by the General Court, ordered “Deer Island to be improved,” and several persons made bequests in their last wills. Similar provision can be cited from the early records of Salem, Cambridge, Dorchester, and other towns of Massachusetts Bay.

The early records of the town of Hartford are obliterated, but within seven years after the first log-house was erected, thirty pounds are appropriated to the schools, and in April, 1643, it is ordered “that Mr. Andrews shall teach the children in the school one year,” and “he shall have for his pains £16, and therefore the townsmen shall go and inquire who will engage themselves to send their children; and all that do so, shall pay for one quarter, at the least, and for more if they do send them, after the proportion of twenty shillings the year; and if they go any week more than one quarter, they shall pay sixpence a week; and if any would send their children and are not able to pay for their teaching, they shall give notice of it to the townsmen, and they shall pay it at the town’s charge.” Mention is also made of one “Goody Betts,” who kept a “Dame School” after the fashion of Shenstone’s “schoolmistress” at Leasower, in England. Similar entries are found in the town records of Windsor and Wethersfield in advance of any school code by the colony of Connecticut.

The records of the town of New Haven are full of evidence of the interest taken by the leading spirits of the colony, particularly by Governor Theophilus Eaton and Rev. John Davenport, in behalf of schools of every grade, and of the education of every class, from the apprentice boy to those who filled the high places in church and state. The first settlement of the colony was in 1638, and within a year a transaction is recorded, which, while it proves the existence of a school at that

early period, also proclaims the protection which the first settlers extended to the indigent, and their desire to make elementary education universal. In 1639, Thomas Fugill is required by the court to keep Charles Higinson, an indentured apprentice, "at school one year;" or else to advantage him as much in his education as a year's learning comes to. In 1641, the town orders "that a Free School be set up," and "our pastor, Mr. Davenport, together with the magistrates, shall consider what yearly allowance is meet to be given to it out of the common stock of the town, and also what rules and orders are meet to be observed in and about the same." To this school "that famous schoolmaster," Ezekiel Cheever,* "was appointed," "for the better training up of youth in this town, that, through God's blessing, they may be fitted for public service hereafter, in church or commonwealth." Not content with a Grammar School, provision was early made for "the relief of poor scholars at the college at Cambridge," and in 1645 forty bushels of wheat were sent forward for this purpose, and this was followed by other donations, and by a richer consignment of young men to enjoy the advantages of the institution. In 1647, in the distribution of home lots, it was ordered in town meeting, that the magistrates "consider and reserve what lot they shall see meet, and most commodious for a college, which they desire may be set up so soon as their ability will reach thereunto." Among the active promoters of education and schools, the name of Governor Eaton, in connection with Mr. Davenport, is particularly prominent. In 1652, he calls a meeting of the magistrates and elders "to let them know what he has done for a schoolmaster;" that he had written a letter to one Mr. Bower, a schoolmaster of Plymouth, and another to Rev. Mr. Landron, a scholar; and many of the town thought there would be need of two schoolmasters—"one to teach boys to read and write," as well as the "Latin schoolmaster." At another time he reports his correspondence with a teacher in Wethersfield, then with one at old Plymouth, and again with one at Norwalk, "so that the town might never be without a sufficient schoolmaster." He seems to have been considerate of the health of the teachers, and proposes to ex-

cuse one "whose health would not allow him to go on with the work of teaching," which he seems to regard as more laborious than that of the ministry. On another occasion he introduces to the committee a schoolmaster who has come to treat about the school. He is allowed £20 a year, and 30 shillings for his expenses in travel, besides his board and lodgings. He wished to have liberty to visit his friends, "which he proposed to be in harvest time, and that his pay be such as wherewith he may buy books." These particulars show the considerate interest taken by men in local authority in the school and the teacher, in advance of any directory or compulsory legislation of the colony of New Haven. It was owing, in part, to the timely suggestions of Rev. Mr. Davenport, that Gov. Edward Hopkins, of Connecticut, by his will, dated London, March 7, 1657, bequeathed the residue of his estate (after disposing of much of his estate in New England) to trustees residing in New Haven and Hartford, "in full assurance of their trust and faithfulness" in disposing of it, "to give some encouragement in those foreign plantations for the breeding up of hopeful youths both at the grammar school and college, for the public service of the country in future times." By the final disposition and distribution of this estate three grammar schools were established at New Haven, Hartford, and Hadley, which are in existence at this day, among the oldest institutions of this class in America.

The early records of the several towns which subsequently constituted a portion of the colony of New Hampshire, exhibit evidence of a different character and spirit in the first settlers. The plantations on the Piscataqua river were made by proprietors from mere commercial motives, and the settlers were selected in reference to immediate success in that direction; and in these settlements we find no trace of any individual or town action in behalf of education until after their union with the colony of Massachusetts, whose laws made the establishment of schools obligatory.

In the early records of the Rhode Island and Providence Plantations, we find traces of the same educational policy which marked the early history of towns in Massachusetts and Connecticut. According to Calender, in Newport, "so early as 1640, Mr. Lenthal was by vote called to keep a public school for the learning of youth, and for

*See Barnard's *American Teachers and Educators*, vol. i., art. "Ezekiel Cheever."

his encouragement there were granted to him and his heirs, one hundred acres of land, and four more for a house lot. It was also voted that one hundred acres should be appropriated for a school for encouragement of the poorer sort to train up their youth in learning. And Mr. Robert Lenthal, while he continues to keep school, is to have the benefit thereof." The proprietors of other plantations reserved a portion of land for the maintenance of schools, and generally of a "free schoole;" and "Mr. Schoolmaster Turpin," petitions the town of Providence, that he and his heirs, so long as any of them should maintain the worthy art of learning, may be invested in the lands set apart for a school.

These citations show the action of the towns independent of any general legislation by the several colonies of New England—action prompted by their own consciousness of the advantages of education in "Dame Schools," in "Free Schools," in "Grammar Schools" and in "Colleges" at home—aided by the presence among them of "masters" and "ushers," and also of "schoolmasters" and "schoolma'ams" willing to engage in the same vocations in the new townships and villages—stimulated by magistrates and ministers, who had themselves received the best education that such schools could give in England, who inculcated the reading of the Scriptures as of daily obligation, and who believed that the foundations of the state should be laid in the virtue and intelligence of the whole people.

COLONIAL LEGISLATION AND ACTION.

We shall now notice briefly the legislation respecting children and schools of each of the colonies, in the order of their settlement.

VIRGINIA.—Although several attempts were made to establish "Free Schools" and a "College" in Virginia, by the Virginia Company and benevolent individuals, at an earlier day, the first general legislation respecting the education of children by the Colonial Assembly was in 1631, when it was enacted: "It is also thought fit, that upon every Sunday the mynister* shall, halfe an hour or more before evening prayer, examine, catechise, and instruct the youths and ignorant persons of his parish in the ten com-

mandments, the articles of the believe, and in the Lord's prayer; and shall diligentlie heere, instruct, and teach the catechisme, sett forth in the book of Common Prayer. And all fathers, mothers, maysters, and mistrisses, shall cause their children, servants, or apprentices, which have not learned their catechisme, to come to church at the time appointed, obedientlie to heare, and to be ordered by the mynister untill they have learned the same. And yf any of sayd fathers, mothers, maysters & mistrisses, children, servants, or apprentices, shall neglect their duties, as the one sorte in not causinge them to come, and the other in refusinge to learne as aforesayd, they shall be censured by the corts in these places holden." To secure the execution of this last clause, it is provided in the oath of the warden, taken before "the justices for the monthlie corts"—"they shall present such mastys and mistresses as shall be delinquent in the catechisinge the youth and ignorant persons. So help you God."

In 1660 an attempt was made to found a college for the supply of educated clergymen. "Whereas the want of able and faithful ministers in this country deprives us of those great blessings and mercies that always attend upon the service of God; which want, by reason of the great distance from our native country, cannot in all probability be always supplied from thence: *Be it enacted*, that for the advance of learning, education of youth, supply of the ministry, and promotion of piety, there be land taken for a college and free school with as much speed as may be convenient, houses erected thereon for entertainment of students and scholars." In the same year it was ordered that a petition be drawn up by the General Assembly to the king for a college and free school; and that there be his letters patent "to collect the charity of well disposed persons in England, for the erecting of colledges & schools in this countrye," and also to bestow universities "to furnish the church here with ministers for the present." And this petition was recommended to the right honorable Governor, Sir William Berkeley. Sir William does not appear, in his reply to the Lords Commissioners of Foreign Plantations, dated 1670, to have been very kindly disposed to public schools of high or low degree.

"Question 23. What course is taken about the instructing the people within your government in the Christian religion;

* In this and some other quotations we have followed the orthography of the original.

and what provision is there made for the payment of your ministry?"

"*Answer.* The same course that is taken in England out of towns; every man according to his ability instructing his children. We have forty-eight parishes, and our ministers are well paid, and by my consent should be better if they would pray oftener and preach less. But of all other commodities, so of this, the worst are sent us, and we had few that we could boast of, since the persecution in Cromwell's tyranny drove divers worthy men hither. But I thank God there are no free schools, nor printing, and I hope we shall not have these hundred years; for learning has brought disobedience and heresy and sects into the world, and printing has divulged them, and libels against the best government. God keep us from both!"

In 1691, "the good design of building a free school and college for the encouragement of learning," was recognized, but it was not till 1693 that an act was passed locating the college, for which a royal charter had been obtained April 8, 1692, with the title of William and Mary, at Middle Plantation, afterward Williamsburgh. Toward its endowment the royal founders granted £2000 in money, land, and a revenue duty on tobacco; and the Assembly enacted an export duty on skins and furs. The money grant of £2000 did not meet with much encouragement from the English Attorney General (Seymour) who was instructed to prepare the charter, who remarked to the Rev. James Blair, the agent of the colony for this purpose, that the money was wanted for other purposes, and that he did not see the slightest occasion for a college in Virginia. The agent represented that the intention of the colony was to educate and qualify young men to be ministers of the Gospel, and begged Mr. Attorney would consider that the people of Virginia had souls to be saved as well as the people of England. "Souls!" said he; "damn your souls! make tobacco." The plan of the building was designed by Sir Christopher Wren. The first commencement was held in 1700, at which, according to Oldmixon, "there was a great concourse of people; several planters came thither in their coaches, and several sloops from New York, Pennsylvania and Maryland; it being a new thing in America to hear graduates perform their academical exercises. The Indians themselves had the curiosity to come to Wil-

liamsburgh on this occasion; and the whole country rejoiced as if they had some relish of learning." After the English fashion, the college had a representative in the General Assembly. As a quitrent for the land granted by the Crown, the students and professors every year marched to the residence of the royal Governor, and presented, and sometimes recited, some Latin verses. On the breaking out of the Revolution the endowments of the college were cut off, and its constitution was somewhat changed.

No general school law was established in Virginia until 1796, although a plan was proposed by Mr. Jefferson in 1779, which recognized three degrees of public instruction, viz.: 1. Elementary schools for all children. 2. Colleges for an extension of instruction suitable for the common purposes of life. 3. A university, an extension of the means of higher culture on the basis of the college at Williamsburgh.

Scattered through the colony were schools in connection with churches, both Episcopal and Presbyterian, and in many families private teachers were employed, and in some cases sons were sent out to England to complete their education.

MASSACHUSETTS.—In 1636, six years after the first settlement of Boston, the General Court of the colony of Massachusetts Bay, which met in Boston on the 8th of September, passed an act appropriating £400 toward the establishment of a college. The sum thus appropriated was more than the whole tax levied on the colony at that time in a single year, and the population scattered through ten or twelve villages did not exceed five thousand persons; but among them were eminent graduates of the university of Cambridge, in England, and all were here for purposes of permanent settlement. In 1638, John Harvard left by will the sum of £779 in money, and a library of over three hundred books. In 1640 the General Court granted to the college the income of the Charlestown ferry; and in 1642 the Governor, with the magistrates and teachers and elders, were empowered to establish statutes and constitutions for the infant institution, and in 1650 granted a charter which still remains the fundamental law of the oldest literary institution in this country.

In 1642 the attention of the General Court was turned to the subject of family instruction in the following enactment:—

"Forasmuch as the good education of children is of singular behoof and benefit to any commonwealth; and whereas many parents and masters are too indulgent and negligent of their duty in this kind:

"It is therefore ordered by this Court and the authority thereof, That the selectmen of every town, in the several precincts and quarters where they dwell, shall have a vigilant eye over their brethren and neighbors, to see, first, that none of them shall suffer so much barbarism in any of their families, as not to endeavor to teach, by themselves or others, their children and apprentices so much learning as may enable them perfectly to read the English tongue, and knowledge of the capital laws, upon penalty of twenty shillings for each neglect therein; also, that all masters of families do, once a week, at least, catechise their children and servants in the grounds and principles of religion, and if any be unable to do so much, that then, at the least, they procure such children or apprentices to learn some short orthodox catechism, without book, that they may be able to answer to the questions that shall be propounded to them out of such catechisms by their parents or masters, or any of the selectmen, where they shall call them to a trial of what they have learned in this kind; and further, that all parents and masters do breed and bring up their children and apprentices in some honest lawful calling, labor or employment, either in husbandry or some other trade profitable for themselves and the commonwealth, if they will not nor cannot train them up in learning to fit them for higher employments; and if any of the selectmen, after admonition by them given to such masters of families, shall find them still negligent of their duty in the particulars aforementioned, whereby children and servants become rude, stubborn and unruly, the said selectmen, with the help of two magistrates, shall take such children or apprentices from them, and place them with some masters for years, boys till they come to twenty-one, and girls eighteen years of age complete, which will more strictly look unto and force them to submit unto government, according to the rules of this order, if by fair means and former instructions they will not be drawn unto it."

In the same year the following general school law was enacted:—"It being one chief project of that old deluder, Satan, to keep men from the knowledge of the Scrip-

tures, as in former times, keeping them in an unknown tongue, so in these latter times, by persuading from the use of tongues, so that at least the true sense and meaning of the original might be clouded and corrupted with false glosses of deceivers; and to the end that learning may not be buried in the grave of our forefathers, in church and commonwealth, the Lord assisting our endeavors:

"It is therefore ordered by this Court and authority thereof, That every township within this jurisdiction, after the Lord hath increased them to the number of fifty householders, shall then forthwith appoint one within their town to teach all such children, as shall resort to him, to write and read, whose wages shall be paid, either by the parents or masters of such children, or by the inhabitants in general, by way of supply, as the major part of those who order the prudentials of the town shall appoint; provided, that those who send their children be not oppressed by paying much more than they can have them taught for in other towns.

"And it is further ordered, That where any town shall increase to the number of one hundred families or householders, they shall set up a grammar school, the masters thereof being able to instruct youths so far as they may be fitted for the university, and if any other town neglect the performance hereof above one year, then every such town shall pay five pounds per annum to the next such school, till they shall perform this order."

With various modifications as to details, but with the same objects steadily in view, viz., the exclusion of "barbarism" from every family, by preventing its having even one untaught and idle child or apprentice, the maintenance of an elementary school in every neighborhood where there were children enough to constitute a school, and of a Latin school in every large town, and of a college for higher culture for the whole colony, the colonial legislature, and the people in the several towns of Massachusetts, maintained an educational system, which, although not as early or as thorough as the school code of Saxony and Wirtemberg, has expanded with the growth of the community in population, wealth, and industrial development, and stimulated and shaped the legislation and efforts of other states in behalf of universal education.

The early records of the colony of Plymouth contain no trace of the zeal for

schools which characterized the colonies of Massachusetts Bay, Connecticut, and New Haven. In 1662 the profits of the codfishery were appropriated to the maintenance of grammar schools in such towns as would make arrangements for the same; and in 1669 towns having fifty families were authorized to raise by rate on all the inhabitants the sum of twelve pounds for this class of schools, "for as much as the maintenance of good literature doth much tend to the advancement of the weal and flourishing state of societies and republics." After the union of the two colonies under one charter, several towns in the old colony were fined for not complying with the provisions of the law of 1647 respecting children and schools.

In addition to the grammar school which each town having one hundred families was obliged by law to maintain, to enable young men to fit for college, in several counties endowed schools were set up; and in 1763 the first of that class of institutions, known and incorporated as academies, was established in the parish of Byfield in the town of Newbury, on a legacy left by Gov. William Dummer. Its objects were the same as those of the town grammar school, but its benefits were not confined to one town, nor was it supported in any degree by taxation.

RHODE ISLAND.—In this colony education was left to individual and parental care, no trace of any legislation on the subject being found in the proceedings of the General Assembly, except to incorporate in 1747 the "Society for the Promotion of Knowledge and Virtue," which was established in Newport in 1730 by the name of the "Company of the Redwood Library;" and in 1764 to grant the charter to the College of Rhode Island, which was first located in Warren, and in 1770 removed to Providence, and in 1804 called, after its most liberal benefactor, Brown University.

CONNECTICUT.—In 1646, Mr. Roger Ludlow was requested to compile "a body of laws for the government of this commonwealth," which was not completed till May, 1650, and is known as the code of 1650. The provisions for the family instruction of children and the maintenance of schools are identically the same as in Massachusetts, and remained on the statute-book, with but slight modifications to give them more efficiency, for one hundred and fifty

years. In the chapter on "capital" offences, it is enacted that if any child above sixteen years of age, and of sufficient understanding, shall curse or smite his father or mother, he shall be put to death, "unless it can be sufficiently testified that the parents have been unchristianly negligent in the education of such children." In the chapter respecting schools, the proposition made by the "Commissioners of the United Colonies," that it be commended to every family which "is able and willing to give yearly but the fourth part of a bushel of corn, or something equivalent thereto," "for the advancement of learning," was approved, and two men were appointed in every town to receive and forward the contributions. This was done in the larger towns of the colonies of Connecticut and New Haven, from time to time, until ten of the principal ministers, in 1700, at Branford, brought each a number of books, and as they laid them on the table, declared—"I give these books for founding a College in Connecticut;" and on that foundation rose Yale College. To fit young men for the college at Cambridge, and subsequently for Yale, in 1672 it was ordered by the General Court, "that in every county there shall be set up a grammar school for the use of the county, the master thereof being able to instruct youths so far as they may be fitted for college;" and to aid the county towns in maintaining their schools, six hundred acres of land were appropriated by the General Court to each, "to be improved in the best manner that may be for the benefit of a grammar school in said towns, and to no other use or end whatsoever;" and in 1677 a fine of ten pounds annually is imposed on any county town neglecting to keep the Latin school. In 1690, the county Latin schools of Hartford and New Haven are denominated "Free Schools," probably in reference to the partial endowment of schools of this class by the trustees of the legacy of Governor Hopkins.

As early as 1700, the system of public instruction in Connecticut embraced the following particulars:

1. An obligation on every parent and guardian of children, "not to suffer so much barbarism in any of their families as to have a single child or apprentice unable to read the holy word of God, and the good laws of the colony;" and also, "to bring them up to some lawful calling or employment," under a penalty for each offence,

2. A tax of forty shillings on every thousand pounds of the lists of estates, was collected in every town with the annual state tax, and payable proportionably to those towns only which should keep their schools according to law.

3. A common school in every town having over seventy families, kept for at least six months in the year.

4. A grammar school in each of the four head county towns to fit youth for college, two of which grammar schools were free or endowed.

5. A collegiate school, toward which the General Court made an annual appropriation of £120.

6. Provision for the religious instruction of the Indians.

The system, therefore, embraced every family and town, all classes of children and youth, and all the then recognized grades of schools. There were no select or sectarian schools to classify society at the roots, but all children were regarded with equal favor, and all brought under the assimilating influence of early associations and similar school privileges. Here was the foundation laid, not only for universal education, but for a practical, political, and social equality, which has never been surpassed in the history of any other community.

NEW HAMPSHIRE.—From 1623 to 1641, the early records of the first settlements within the present limits of New Hampshire exhibit no trace of educational enactments; from 1641 to 1680, the school laws of Massachusetts prevailed, and the presence of such men as Philemon Purmont and Daniel Maude, who were the first schoolmasters of that colony, must have contributed to inaugurate the policy of local and endowed schools. When the necessities of the college at Cambridge were made known, the people of Portsmouth, in town meeting, made a collection of sixty pounds, with a pledge to continue the same amount for seven years, "for the perpetuating of knowledge both religious and civil among us and our posterity after us." In the original grants for towns one lot was reserved for the support of schools.

In 1680 New Hampshire became a separate colony, and in 1693 the Colonial Assembly enacted "that for the building and repairing of meeting houses, ministers' houses, and allowing a salary to a schoolmaster in each town within this province,

the selectmen shall raise by an equal rate an assessment upon the inhabitants;" and in 1719 it was ordained that every town having fifty householders should be constantly provided with a schoolmaster to teach children to read and write; and those having one hundred should maintain a grammar school, to be kept by some decent person, of good conversation, well instructed in the tongues. In 1721 it was ordered that not only each town but each parish of one hundred families should be constantly provided with a grammar school, or forfeit the sum of twenty pounds to the treasury of the province. This system of elementary and secondary instruction continued substantially until the adoption of the state constitution in 1792.

In 1770 Dr. Wheelock removed a school which he had established in Lebanon, Connecticut, under the name of "Moor's Indian Charity School," to the depths of the forests in the western part of New Hampshire. Here, side by side with the school for Indians, he organized another institution, termed a college in the charter granted by Governor Wentworth in 1769, and which held its first commencement in 1771, with four graduates, one of whom was John Wheelock, the second president of the institution, which was called Dartmouth College after Lord Dartmouth, one of the largest benefactors of the Charity School.

At the close of the colonial period of our history, according to Noah Webster, the condition of the educational system in Connecticut and New England was as follows:

"The law of Connecticut ordains that every town or parish containing seventy householders, shall keep an English school, at least eleven months in the year; and towns containing a less number, at least six months in the year. Every town keeping a public school is entitled to draw from the treasury of the state a certain sum of money, proportioned to its census in the list of property which furnishes the rule of taxation. This sum might have been originally sufficient to support one school in each town or parish, but in modern times is divided among a number, and the deficiency of money to support the schools is raised upon the estates of the people, in the manner the public taxes are assessed. To extend the benefits of this establishment to all the inhabitants, large towns and parishes are di-

vided into districts, each of which is supposed able to furnish a competent number of scholars for one school. In each district a house is erected for the purpose by the inhabitants of that district, who hire a master, furnish wood, and tax themselves to pay all expenses not provided for by the public money. The school is kept during the winter months, when every farmer can spare his sons. In this manner, every child in the state has access to a school. In the summer, a woman is hired to teach small children, who are not fit for any kind of labor. In the large towns, schools, either public or private, are kept the whole year; and in every county town, a grammar school is established by law.

"The beneficial effects of these institutions will be experienced for ages. Next to the establishments in favor of religion, they have been the nurseries of well-informed citizens, brave soldiers and wise legislators. A people thus informed are capable of understanding their rights and of discovering the means to secure them. In the next place, our forefathers took measures to preserve the reputation of schools and the morals of youth, by making the teaching them an honorable employment. Every town or district has a committee, whose duty is to procure a master of talents and character; and the practice is to procure a man of the best character in the town or neighborhood. The wealthy towns apply to young men of liberal education, who, after taking the bachelor's degree, usually keep school a year or two before they enter upon a profession. One of the most unfortunate circumstances to education in the Middle and Southern states, is an opinion that school-keeping is a mean employment, fit only for persons of low character. The wretches who keep the schools in those states very frequently degrade the employment; but the misfortune is, public opinion supposes the employment degrades the man: of course no gentleman will undertake to teach children while in popular estimation he must forfeit his rank and character by the employment. Until public opinion is corrected by some great examples, the common schools, what few there are in those states, must continue in the hands of such vagabonds as wander about the country."

"Nearly connected with the establishment of schools is the circulation of newspapers in New England. This is both a conse-

quence and a cause of a general diffusion of letters. In Connecticut, almost every man reads a paper every week. In the year 1785, I took some pains to ascertain the number of papers printed weekly in Connecticut and in the Southern states. I found the number in Connecticut to be nearly eight thousand; which was equal to that published in the whole territory south of Pennsylvania. By means of this general circulation of public papers, the people are informed of all political affairs; and their representatives are often prepared to deliberate on propositions made to the legislature.

"Another institution favorable to knowledge is the establishment of parish libraries. These are procured by subscription, but they are numerous, the expense not being considerable, and the desire of reading universal. One hundred volumes of books, selected from the best writers, on ethics, divinity, and history, and read by the principal inhabitants of a town or village, will have an amazing influence in spreading knowledge, correcting the morals, and softening the manners of a nation. I am acquainted with parishes where almost every householder has read the works of Addison, Sherlock, Atterbury, Watts, Young, and other similar writings; and will converse well on the subjects of which they treat."

NEW YORK.—In the early history of the settlements of the New Netherlands, the school was regarded as an appendage of the church, and the schoolmaster was paid in part out of the funds of the government. Down to its organization as a royal province of England, a parochial school existed in every parish. In 1658 a petition of the burgomasters and schepens of New Amsterdam was forwarded to the West India Company, in which "it is represented that the youth of this place and the neighborhood are increasing in number gradually, and that most of them can read and write, but that some of the citizens and inhabitants would like to send their children to a school the principal of which understands Latin, but are not able to do so without sending them to New England; furthermore, they have not the means to hire a Latin schoolmaster, expressly for themselves, from New England, and therefore they ask that the West India Company will send out a fit person as Latin schoolmaster, not doubting that the number of persons who will send

their children to such teacher will from year to year increase, until an academy shall be formed whereby this place to great splendor will have attained, for which, next to God, the honorable company which shall have sent such teacher here shall have laud and praise." In compliance with this petition, Dr. Alexander Carolus Curtius, a Latin master of Lithuania, was sent out by the company. The burgomasters proposed to give him five hundred guilders annually out of the city treasury, with the use of a house and garden, and the privilege of collecting a tuition of six guilders per quarter of each scholar. Dr. Curtius proved not to be a good disciplinarian, and parents complained to the authorities that "his pupils beat each other, and tore the clothes from each other's backs." The doctor retorted that he could not interfere, "as his hands were tied, as some of the parents forbade him punishing their children." He accordingly gave up his place and returned to Holland, and was succeeded in the mastership by Rev. Ægidius Luyck in 1662. His school had a high reputation, and was resorted to by pupils from Virginia, Fort Orange, and the Delaware.

After the establishment of the English authority, the governor claimed the privilege of licensing teachers even for the church schools, but no general school policy was established. In 1702 a free grammar school was founded and built on the King's Farm, and in 1732 a "Free School," for teaching the Latin and Greek and practical branches of mathematics, was incorporated by law. The preamble of the act of incorporation opens as follows: "Whereas the youth of this colony are found by manifold experience to be not inferior in their natural genius to the youth of any other country in the world, therefore be it enacted," etc. In 1710, the Society for the Propagation of the Gospel in Foreign Parts established a charity school in connection with the Episcopal church, which is still in existence, and is now known as the Trinity School. In 1750, Charles Dutens announced to the public "that he taught a school for the use of young ladies and gentlemen, whose love of learning might incline them to take lessons from him in French, at his house on Broad street, near the Long Bridge, where he also makes and vends finger and ear rings, solitaires, stay-hooks and locketts, and sets diamonds, rubies, and other stones. Science

and virtue are two sisters, which the most part of the New York ladies possess," etc.

Judge Smith, in his "History of the Province of New York," when speaking of the action of the legislature for founding a college in 1746, says: "To the disgrace of our first planters, who beyond comparison surpassed their eastern neighbors in opulence, Mr. Delancy, a graduate of the University of Cambridge (England), and Mr. Smith, were for many years the only academics in this province, except such as were in holy orders; and so late as the period we are now examining (1750), the author did not recollect above thirteen men, the youngest of whom had his bachelor's degree at the age of seventeen, but two months before the passing of the above law, the first toward erecting a college in this colony, though at a distance of above one hundred and twenty years after its discovery and settlement of the capital by Dutch progenitors from Amsterdam."

In 1754 a royal charter was obtained for a college in New York, with the style of King's College, which came into possession of a fund raised by a lottery authorized for this purpose by the Assembly in 1746, and of a grant of land conveyed to its governors by Trinity Church in 1755. Out of this grant, Columbia College is now (1860) realizing an income of \$60,000 a year. The first commencement was celebrated in 1758.

"For the advantage of our new intended college" (King's), "and the use and ornament of the city," a number of eminent citizens of New York, in 1754, united in an association to form a library, which in 1772 was incorporated with the title of the "New York Society Library."

MARYLAND.—The first settlement was effected within the present limits of Maryland in 1634; and in the years immediately following, we find no record of any marked individual or legislative effort to establish institutions of learning. The first act of the colonial Assembly is entitled a "Supplicatory Act to their sacred majesties for erecting of schools," which was passed in 1694, and repealed or superseded by an act entitled a "Petitionary Act" for the same purpose. Appealing to the royal liberality, which had been extended to the neighboring colony of Virginia in the institution of the college, "a place of universal study," the Assembly ask, "that for the propagation of the Gospel, and the education of the youth of this province

in good letters and manners, that a certain place or places for a free school or schools, or place of study of Latin, Greek, writing and the like, consisting of one master, one usher, and one writing-master or scribe to a school, and 100 scholars," be established in Arundel County, of which the Archbishop of Canterbury should be chancellor, and to be called "King William's School;" and a similar free school is asked for in each county, to be established from time to time as the resources of the several counties may suffice. To increase the educational resources of the counties, in 1717 it was enacted that an additional duty of twenty shillings current money per poll should be levied on all Irish servants, being papists, to prevent the growth of popery by the importation of too great a number of them into this province, and also an additional duty of twenty shillings current money per poll on all negroes, for raising a fund for the use of public schools. In 1723, "an act for the encouragement of learning, and erecting schools in the several counties," was passed, with a preamble setting forth that preceding Assemblies have had it much at heart, "to provide for the liberal and pious education of the youth of the province, and improving their natural abilities and acuteness (which seem not to be inferior to any), so as to be fitted for the discharge of their duties in the several stations and employments in it, either in regard to church or state." By this act seven visitors are appointed in each county, with corporate powers to receive and hold estate to the value of £100 per annum; and they are authorized with all convenient speed to purchase, out of funds realized from revenues already set apart for this purpose, one hundred acres more or less, one moiety of which is to serve for making corn, grain, and pasture for the benefit and use of the master, who is prohibited growing tobacco, or permitting it by others on said farm. The visitors are directed to employ good schoolmasters, members of the Church of England, and of pious and exemplary lives and conversation, and capable of teaching well the grammar, good writing, and the mathematics, if such can be conveniently got, on a salary of £20 per annum, and the use of the plantation. In 1728 the master of each public school is directed "to teach as many poor children gratis as the majority of the visitors should order."

Up to the establishment of the state gov-

ernment in 1777, there was no system of common schools for elementary instruction in operation in Maryland. "A free school," like the free endowed grammar school of England, was established in a majority of counties, two of which were subsequently converted into colleges, that of Charlestown in Kent county, into Washington College in 1782, and the second at Annapolis into St. John's College in 1784—the former "in honorable and perpetual memory of his excellency General Washington, the illustrious and virtuous commander-in-chief of the armies of the United States."

In 1696, Rev. Thomas Bray, then residing in the parish of Sheldon, England, was made commissary of Maryland, to establish the Church of England in the colony. His first act was to inaugurate a plan of parochial libraries for the use of ministers in each parish. Through his influence, Princess Anne made a benefaction for this purpose, and in acknowledgment of the honor of having the capital of the province called after her name (Annapolis), donated books to the value of four hundred pounds to the parish library, which he called "the Annapolitan Library." By his influence in England a plan of "lending-libraries" was projected in every deanery throughout the kingdom, and carried out.

NEW JERSEY.—In the history of New Jersey as a colony we find no trace of any general legislation or governmental action in behalf of schools. Scattered at wide intervals over the state were schools kept by clergymen in connection with their churches.

In 1748 a charter of incorporation for the College of New Jersey was obtained from George II., during the administration of Governor Belcher, "for the instruction of youth in the learned languages and liberal arts and sciences." During the administration of Governor Franklin in 1770, a second college was chartered, with the name of Queen's (now Rutgers') College, as a school of theology for the Reformed Dutch Church. Neither of the institutions received any aid from the government.

PENNSYLVANIA.—The frame of government of the province of Pennsylvania, dated April 25th, 1682, drawn up by William Penn before leaving England, contains the following provision: "The governor and

provincial council shall erect and order all public schools and reward the authors of useful sciences and laudable inventions in said province." In the laws agreed upon a few months later in the same year by the governor and divers freemen of the province in England, it is provided "that all children within this province of the age of twelve years shall be taught some useful trade, or skill, to the end that none be idle, but that the poor may work to live, and the rich, if they become poor, may not want." In 1683 the governor and council in Philadelphia, "having taken into their serious consideration the great necessity there is of a schoolmaster in the town of Philadelphia, sent for Enoch Flower, an inhabitant of said town, who for twenty years past hath been exercised in that care and employment in England, to whom having communicated their minds, he embraced it upon the following terms: to learn to read English, 4s. by the quarter;" to learn to read and write, 6s.; read, write and cast accounts, 8s.; for boarding a scholar, £10 per year. In 1689 the Society of Friends established a Latin school of which George Keith was the first teacher. In 1725 Rev. Francis Alison, a native of Ireland, but educated at Glasgow, became pastor of the Presbyterian church in New London, in Chester county, and opened a school there, which had great reputation. He at one time resided at Thunder Hill, in Maryland, where he educated many young men who were afterward distinguished in the Revolutionary struggle. He was subsequently Provost of the college at Philadelphia.

In 1749 Benjamin Franklin published his "*Proposals relating to the Education of Youth in Pennsylvania*," out of which originated subsequently an academy and charity school, and ultimately the University of Pennsylvania. At the head of the English department of the academy in 1751 was Mr. Dove, who was then engaged in giving public lectures in experimental philosophy with apparatus—an early lyceum or popular lecturer.

In 1743 the American Philosophical Society originated in a "Proposal for Promoting Useful Knowledge," published by Benjamin Franklin, which, after various forms of organization, took its present name and shape on the 2d of January, 1769.

In 1765 the Medical School originated with the appointment of Dr. Morgan to the

professorship of the theory and practice of physic; in 1767 it was fully organized, and in 1768 degrees in medicine were for the first time conferred.

Among the denominational schools which grew up in the absence of any general legislation on the subject, was a Moravian school for boys at Nazareth in 1747, and for girls at Bethlehem 1749, both of which are still in existence, and the latter, especially, since 1789, has been one of the most flourishing female seminaries in this country.

DELAWARE.—In the early settlements of the Swedes and Dutch in Delaware, the policy of connecting a school with the church was probably imperfectly carried out, but there is no historical trace of its existence. The only school legislation of the colony extant, is an act incorporating "the Trustees of the Grammar School in the borough of Wilmington, and county of New Castle," dated April 10, 1773.

NORTH CAROLINA.—In North Carolina for fifty years, the policy of the provincial authorities was to discourage all forms of religious and educational activity outside of the Church of England, to the extent of forbidding expressly the establishment of printing presses. The first act on record relating to schools, in 1764, was "for the building of a house for a school, and the residence of a schoolmaster in the town of Newbern"—appropriating the half of two lots, before set apart for a church, for this purpose. In 1766 another act was passed incorporating trustees for this school, with the preamble "that a number of well-disposed persons, taking into consideration the great necessity of having a proper school, or public seminary of learning established, whereby the present generation may be brought up and instructed in the principles of the Christian religion, and fitted for the several offices and purposes of life, have at great expense erected a school-house for this purpose;" and providing that the master of the school shall be "of the established Church of England, and licensed by the governor." Similar acts were passed in 1770 and 1779 for schools at Edenton and Hillsborough. In 1770 an act, reciting that a very promising experiment had been made in the town of Charlotte in the county of Mecklenburg, with a seminary of learning "a number of youths there taught making great advancement in the knowledge of the

learned languages, and in the rudiments of the arts and sciences, having gone to various colleges in distant parts of America," incorporates the same with the name of Queen's College. This act was repealed by proclamation in the next year, but in 1777 it was reincorporated by name of "Liberty Hall." With the downfall of the royal authority, and the religious party which had swayed the colony, a new educational policy was inaugurated.

SOUTH CAROLINA.—In the early history of the colony of South Carolina, as of several other colonies, the first efforts to establish schools were in connection with the predominant church of the settlers, *i. e.*, of the Church of England, through the aid of the "Venerable Society for Propagating the Gospel in Foreign Parts." By the missionaries of that society charity schools were established in several parishes, some of which were afterward endowed by individuals, and incorporated by act of the legislature, and called "Free Schools." In 1710 a free school of this character was established at Goosecreek, and in 1712 in Charleston; and by the general act of February 22, 1722, the justices of the county courts were authorized to erect a free school in each county and precinct, to be supported by assessment on land and negroes. These schools were bound to teach ten poor children each, if sent by said justices. In 1724, a memorial to the "Venerable Society" from the parish of Dorchester sets forth—"The chief source of irreligion here is the want of schools; and we may justly be apprehensive, that if our children continue longer to be deprived of opportunities of being instructed, Christianity will of course decay insensibly, and we shall have a generation of our own as ignorant as the native Indians." The society sent out schoolmasters to this and other parishes, and about 2000 volumes of bound books. In 1721 Mr. Richard Beresford bequeathed to the parish of St. Thomas and St. Dennis, in trust, for the purpose of educating the poor, £6500; and in 1732 Mr. Richard Harris, for the same object, £1000. In 1728 Rev. Richard Ludlam bequeathed his whole estate to the parish of St. James, which in 1778 amounted to £15,272. Other bequests for the same objects were made at different times before the Revolution. In 1743 Rev. Alexander Garden wrote to the society that the negro

school consisted of thirty children, and in 1750 that it was going on with all desirable success. In 1748 a library was founded in Charleston by an association of seventeen young men, whose first object was to collect new pamphlets and magazines published in Great Britain, but in the course of a year embraced the purchase of books. After many delays and refusals, an act of incorporation was obtained in 1754. There is but one older library in this country.

GEORGIA.—The earliest effort to establish schools in Georgia was made by the Rev. George Whitefield. Before leaving England in 1737, he had projected an Orphan House, after the plan of that of Dr. Franké, at Halle, of which an account about that time appeared in English. His first visit to Savannah in 1738 satisfied him of the necessity of a charity school for poor and neglected children, and in the course of that year he returned to England to obtain his ordination as priest and collect funds for his educational enterprise. The trustees of the colony gave him five hundred acres of land upon which to erect his buildings. These were selected about ten miles out of Savannah, and on the 25th of March, 1740, he laid the first brick of the house, which he called Bethesda, or House of Mercy, and opened his school in temporary shelters with forty children. In the fall of the same year he made a collection and preaching tour in New England, during which he collected over £800 for his charity. After disasters by fire, etc., the Orphan House property was bequeathed to Selina, Countess of Huntingdon, in trust for the purposes originally designed, and subsequently incorporated for this purpose. On her death, and after the Revolution, the legislature transferred the property to thirteen trustees, to manage the estate and make regulations for an academy in the county of Chatham. Schools were established by the missionaries sent out by the Society for the Propagation of the Gospel at Savannah, Augusta, and Frederica, and by the Moravians and Huguenots in their respective settlements.

RESULTS AT THE CLOSE OF OUR COLONIAL HISTORY.

The educational systems and provisions of the colonial period of the United States were, especially in its earlier portion, closely connected with the ecclesiastical systems of

the colonies. Schools were maintained by individual youth trained up in very many cases, because it was a duty to prepare useful future members of the church, which in some of the colonies was also the state.

In three states, Massachusetts, Connecticut, and New Hampshire, it was very early made the legal duty of parents and towns to make provision for the education of youth. Elsewhere, such efforts as were made, aside from the natural desire of parents to afford their children such an education as was suitable to their rank in life, or such as would aid their subsequent progress and prosperity, were, generally speaking, put forth by clergymen, ecclesiastical bodies, or pious laymen, for colonial institutions for secondary education were not very numerous, including the town grammar schools of New England, and a small number of endowed or free schools. In these two classes of institutions, a small number of pupils were prepared to enter college. A far greater number of college students, more especially in the middle and southern states, were prepared by clergymen, who received each a small number of pupils into his family, as a means of securing some additional income. There were also a few private schools of considerable reputation and value.

In connection with these educational agencies, the small parochial and social libraries, and the two or three associations for the increase and dissemination of science, should also be referred to.

The institutions of superior education, established during the colonial period, were seven in number; namely, Harvard, William and Mary, Yale, Nassau Hall, Rutgers, Brown, and Columbia. From these came forth nearly all the liberally educated men of that day, though it was a custom of a few of the wealthiest families of the day to graduate their sons at a European university, Oxford or Cambridge being commonly selected. The colonial colleges, like the schools preparatory to them, were substantially church institutions, their pupils being the stock from which the clerical body was reinforced.

It was not until the very close of the colonial period that a few special or professional schools were established. A school of medicine, sufficiently entitled to the name, gave degrees in New York in 1769; a sort of theological seminary was founded in Pennsylvania in 1778; while the first law school

only arose the year after the peace of 1783. Professorships, however, in these departments, had afforded a certain amount of instruction in all of them as part of the college course, long before; indeed, from the foundation of the earliest colleges.

Female education was comparatively neglected in the colonial period. Girls were taught housewifely duties far more assiduously than learning, and often depended upon home instruction for whatever education they received; neither the common schools nor those for secondary education affording or being designed to afford accommodation for them.

That special supplementary training which at the present day does so much to alleviate the misfortunes of the blind, the deaf and dumb, and the feeble minded, was quite unknown, nor was the idea entertained that such a training was practicable.

CHAPTER II.

REVOLUTIONARY AND TRANSITIONAL PERIOD.

THE immediate effects of the war of the Revolution were adverse, and, in certain aspects, disastrous to the interests of education. Dangers so great and imminent almost engrossed all thought and absorbed all exertion and resources. Children, indeed, were not left without the instruction of the family and the local elementary school, and they were, thank God, everywhere surrounded with the most stirring exhibitions of heroic patriotism and the self-sacrificing virtues. But too generally the elementary school and the teacher, never properly appreciated, gave way to more pressing and universally-felt necessities. Higher education for a time experienced a severe shock. The calls of patriotism withdrew many young men from the colleges and the preparatory schools, and prevented many more from resorting thither. The impoverishment of the country, and the demand for immediate action, compelled others to relinquish an extended course of professional study. In some cases the presence of armies caused a suspension of college instruction and the dispersion of faculty and students, and even converted the college buildings into barracks. But the action and influence of this period were not wholly adverse or disastrous to schools and higher education. The

public mind was stimulated into greatly increased activity—now, for the first time, assuming a collective existence and national characteristics. The heart of the people was thoroughly penetrated by the spirit of self-sacrifice, in cheerfully bearing the burdens of society with diminished resources, and in repairing the waste and destruction of the war. The examples of wisdom and eloquence in council, and courage and heroism in the field, and of patient endurance of privation and hardship, and towering above all and outshining all, the colossal greatness and transparent purity of the character of Washington—these were lessons for the head and the heart of a young nation, which amply compensated for the partial and temporary suspension of schools. In the discussion and reconstruction of political society, in framing constitutions and organic legislation, and in the disposition of unsettled territory, the importance of the elementary school, the academy, and the college, was recognized and provided for.

Among the earliest to do justice to this great subject was Noah Webster, who, in a series of essays, first published in a New York paper, and copied extensively by the press in other parts of the country, and afterward embodied in a volume with other fugitive pieces, advocated a liberal policy by the national and local governments in favor of a broad system of education. "Here every class of people should know and love the laws. This knowledge should be diffused by means of schools and newspapers; and an attachment to the laws may be formed by early impression upon the mind. Two regulations are essential to the continuance of republican governments: 1. Such a distribution of lands and such principles of descent and alienation as shall give every citizen a power of acquiring what his industry merits. 2. Such a system of education as shall give every citizen an opportunity of acquiring knowledge, and fitting himself for places of trust." "Education should be the first care of a legislature; not merely the institution of schools, but the furnishing them with the best men for teachers. A good system of schools should be the first article in a code of political regulations; for it is much easier to introduce and establish an effectual system for preserving morals, than to correct by penal statutes the ill effects of a bad system. I am so fully persuaded of this, that I should almost adore that great man who shall change

our practice and opinions, and make it respectable for the first and best men to superintend the education of youth." As specimens of the utterances of eminent public men on this subject, we cite the following:

"Promote, as an object of primary importance, institutions for the general diffusion of knowledge. In proportion as the structure of a government gives force to public opinion, it is essential that public opinion should be enlightened." GEORGE WASHINGTON.

"The wisdom and generosity of the legislature in making liberal appropriations in money for the benefit of schools, academies and colleges, is an equal honor to them and their constituents, a proof of their veneration for letters and science, and a portent of great and lasting good to North and South America, and to the world. Great is truth—great is liberty—great is humanity—and they must and will prevail." JOHN ADAMS.

"I look to the diffusion of light and education as the resources most to be relied on for ameliorating the condition, promoting the virtue, and advancing the happiness of man. And I do hope, in the present spirit of extending to the great mass of mankind the blessings of instruction, I see a prospect of great advancement in the happiness of the human race, and this may proceed to an indefinite, although not an infinite, degree. A system of general instruction, which shall reach every description of our citizens, from the richest to the poorest, as it was the earliest, so shall it be the latest of all the public concerns in which I shall permit myself to take an interest. Give it to us, in any shape, and receive for the inestimable boon the thanks of the young, and the blessings of the old, who are past all other services but prayers for the prosperity of their country, and blessings to those who promote it."

THOMAS JEFFERSON.

"Learned institutions ought to be the favorite objects with every free people; they throw that light over the public mind which is the best security against crafty and dangerous encroachments on the public liberty. They multiply the educated individuals, from among whom the people may elect a due portion of their public agents of every description, more especially of those who are to frame the laws: by the perspicuity, the

consistency, and the stability, as well as by the justice and equal spirit of which, the great social purposes are to be answered."

JAMES MADISON.

"Moral, political and intellectual improvement, are duties assigned by the Author of our existence to social, no less than to individual man. For the fulfilment of these duties, governments are invested with power, and to the attainment of these ends, the exercise of this power is a duty sacred and indispensable."

JOHN QUINCY ADAMS.

"For the purpose of promoting the happiness of the State, it is absolutely necessary that our government, which unites into one all the minds of the State, should possess in an eminent degree not only the understanding, the passions, and the will, but above all, the moral faculty and the conscience of an individual. Nothing can be politically right that is morally wrong; and no necessity can ever sanctify a law that is contrary to equity. Virtue is the soul of a Republic. To promote this, laws for the suppression of vice and immorality will be as ineffectual as the increase and enlargement of jails. There is but one method of preventing crime and of rendering a republican form of government durable; and that is, by disseminating the seeds of virtue and knowledge through every part of the State, by means of proper modes and places of education; and this can be done effectually only by the interference and aid of the legislature. I am so deeply impressed with this opinion, that were this the last evening of my life, I would not only say to the asylum of my ancestors and my beloved native country, with the patriot of Venice, '*Esto perpetua*,' but I would add, as the best proof of my affection for her, my parting advice to the guardians of her liberties, establish and support PUBLIC SCHOOLS in every part of the State."

BENJAMIN RUSH.

"There is one object which I earnestly recommend to your notice and patronage—I mean our institutions for the education of youth. The importance of common schools is best estimated by the good effects of them where they most abound and are best regulated. Our ancestors have transmitted to us many excellent institutions, matured by the wisdom and experience of ages. Let them descend to posterity, accompanied with others, which, by promoting useful knowledge,

and multiplying the blessings of social order, diffusing the influence of moral obligations, may be reputable to us, and beneficial to them."

JOHN JAY.

"The first duty of government, and the surest evidence of good government, is the encouragement of education. A general diffusion of knowledge is the precursor and protector of republican institutions, and in it we must confide as the conservative power that will watch over our liberties and guard them against fraud, intrigue, corruption and violence. I consider the system of our Common Schools as the palladium of our freedom, for no reasonable apprehension can be entertained of its subversion, as long as the great body of the people are enlightened by education. To increase the funds, to extend the benefits, and to remedy the defects of this excellent system, is worthy of your most deliberate attention. I can not recommend in terms too strong and impressive, as munificent appropriations as the faculties of the State will authorize for all establishments connected with the interests of education, the exaltation of literature and science, and the improvement of the human mind."

DE WITT CLINTON.

"The parent who sends his son into the world uneducated, defrauds the community of a lawful citizen, and bequeaths to it a nuisance."

CHANCELLOR KENT.

In the discussions which have taken place in the press and in the halls of legislation on the subject, the experience of the New England States is constantly cited as an irrefutable argument in favor of public schools and universal education. The character and value of this example are admirably set forth by Daniel Webster:

"In this particular, New England may be allowed to claim, I think, a merit of a peculiar character. She early adopted and has constantly maintained the principle, that it is the undoubted right, and the bounden duty of government, to provide for the instruction of all youth. That which is elsewhere left to chance, or to charity, we secure by law. For the purpose of public instruction, we hold every man subject to taxation in proportion to his property, and we look not to the question, whether he himself have, or have not, children to be benefited by the education for which he pays. We regard it

as a wise and liberal system of police, by which property, and life, and the peace of society are secured. We seek to prevent in some measure the extension of the penal code, by inspiring a salutary and conservative principle of virtue and of knowledge in an early age. We hope to excite a feeling of respectability, and a sense of character, by enlarging the capacity, and increasing the sphere of intellectual enjoyment. By general instruction, we seek, as far as possible, to purify the whole moral atmosphere; to keep good sentiments uppermost, and to turn the strong current of feeling and opinion, as well as the censures of the law, and the denunciations of religion, against immorality and crime. We hope for a security, beyond the law, and above the law, in the prevalence of enlightened and well-principled moral sentiment. We hope to continue and prolong the time when, in the villages and farm-houses of New England, there may be undisturbed sleep within unbarred doors. And knowing that our government rests directly on the public will, that we may preserve it, we endeavor to give a safe and proper direction to that public will. We do not, indeed, expect all men to be philosophers or statesmen; but we confidently trust, and our expectation of the duration of our system of government rests on that trust, that by the diffusion of general knowledge and good and virtuous sentiments, the political fabric may be secure, as well against open violence and overthrow, as against the slow but sure undermining of licentiousness."

The action of Congress, and of the early constitutional conventions of the several states, shows how nobly the public mind responded to these appeals.

On the 17th of May, 1784, Mr. Jefferson, as chairman of a committee for that purpose, introduced into the old Congress an ordinance respecting the disposition of the public lands; but this contained no reference to schools or education. On the 4th of March, 1785, another ordinance was introduced—by whom does not appear on the journal—and on the 16th of the same month was recommended to a committee consisting of Pierce Long of New Hampshire, Rufus King of Massachusetts, David Howell of Rhode Island, Wm. S. Johnson of Connecticut, R. R. Livingston of New York, Charles Stewart of New Jersey, Joseph Gardner of Pennsylvania, John Henry of Maryland, William Grayson of Virginia, Hugh Williamson of

North Carolina, John Bull of South Carolina, and William Houston of Georgia. On the 14th of April following, this committee reported the ordinance—by whom drawn up no clue is given—which, after being perfected, was passed the 20th of May following, and became the foundation of the existing land system of the United States.

By one of its provisions, the sixteenth section of every township was reserved "*for the maintenance of public schools*;" or, in other words, one section out of the thirty-six composing each township. The same provision was incorporated in the large land sale, in 1786, to the Ohio Company, and the following year in Judge Symmes' purchase. The celebrated ordinance of 1787, for the government of the territory north-west of the River Ohio, and which confirmed the provisions of the land ordinance of 1785, provides further, that, "RELIGION, MORALITY and KNOWLEDGE being necessary to good government and the happiness of mankind, SCHOOLS, AND THE MEANS OF EDUCATION, SHALL BE FOREVER ENCOURAGED." From that day to the present, this noble policy has been confirmed and extended, till its blessings now reach even the distant shores of the Pacific, and FIFTY MILLIONS OF ACRES of the public domain have been set apart and consecrated to the high and ennobling purposes of education, together with five per cent. of the net proceeds of the sales of all public lands in each of the states and territories in which they are situated.

During this period individual beneficence and associated enterprise began to be directed to the building up, furnishing, and maintaining libraries, colleges, academies, and scientific institutions. Societies for the promotion of science and literature, and schools for professional training, were founded and incorporated, and men of even moderate fortune began to feel the luxury of doing good, and to see that a wise endowment for the relief of suffering, the diffusion of knowledge, the discovery of the laws of nature, the application of the principles of science to the useful arts, the conservation of good morals, and the spread of religious truth, is, in the best sense of the term, a good investment—an investment productive of the greatest amount of the highest good both to the donor and his posterity, and which makes the residue of the property from which it is taken both more secure and more valuable.

CHAPTER III.

PROGRESS OF COMMON OR ELEMENTARY SCHOOLS.

To understand the real progress which has been made in the organization, administration, and instruction of institutions of learning in this country, and at the same time to appreciate the importance of many agencies and means of popular education besides schools, books and teachers, we must, as far as we can, look into the schools themselves, as they were fifty and sixty years ago, and realize the circumstances under which some of the noblest characters of our history have been developed. As a contribution to our knowledge of the early history of education in the United States, we bring together the testimony of several eminent men who were pupils or teachers in these schools, and who assisted in various ways in achieving their improvement.

LETTER FROM NOAH WEBSTER, LL.D.

"NEW HAVEN, March 10th, 1840.

"MR. BARNARD: *Dear Sir*—You desire me to give you some information as to the mode of instruction in common schools when I was young, or before the Revolution. I believe you to be better acquainted with the methods of managing common schools, at the present time, than I am; and I am not able to institute a very exact comparison between the old modes and the present. From what I know of the present schools in the country, I believe the principal difference between the schools of former times and at present consists in the books and instruments used in the modern schools.

"When I was young, the books used were chiefly or wholly Dilworth's Spelling Books, the Psalter, Testament and Bible. No geography was studied before the publication of Dr. Morse's small books on that subject, about the year 1786 or 1787. No history was read, as far as my knowledge extends, for there was no abridged history of the United States. Except the books above mentioned, no book for reading was used before the publication of the Third Part of my Institute, in 1785. In some of the early editions of that book, I introduced short notices of the geography and history of the United States, and these led to more enlarged descriptions of the country. In 1788, at the request of Dr. Morse, I wrote an ac-

count of the transactions in the United States, after the Revolution; which account fills nearly twenty pages in the first volume of his octavo editions.

"Before the Revolution, and for some years after, no slates were used in common schools; all writing and the operations in arithmetic were on paper. The teacher wrote the copies and gave the sums in arithmetic; few or none of the pupils having any books as a guide. Such was the condition of the schools in which I received my early education.

"The introduction of my Spelling Book, first published in 1783, produced a great change in the department of spelling; and from the information I can gain, spelling was taught with more care and accuracy for twenty years or more after that period, than it has been since the introduction of multiplied books and studies.*

"No English grammar was generally taught in common schools when I was young, except that in Dilworth, and that to no good purpose. In short, the instruction in schools was very imperfect, in every branch; and if I am not misinformed, it is so to this day, in many branches. Indeed there is danger of running from one extreme to another, and instead of having too few books in our schools, we shall have too many.

"I am, sir, with much respect, your friend and obedient servant, N. WEBSTER."

Dr. Webster, in an essay published in a New York paper in 1788, "On the Education of Youth in America," and in another essay published in Hartford, Ct., in 1790, "On Property, Government, Education, Religion, Agriculture, etc., in the United States,"† while setting forth some of the cardinal doctrines of American education as now held, throws light on the condition of schools and colleges in different parts of the country at that date.

"The first error that I would mention is a

* "The general use of my Spelling Book in the United States has had a most extensive effect in correcting the pronunciation of words, and giving uniformity to the language. Of this change, the present generation can have a very imperfect idea."

† These essays were afterwards collected with others in a volume entitled "A Collection of Essays and Fugitive Writings, etc." By Noah Webster, Jr. Boston: 1790.

too general attention to the dead languages, with a neglect of our own. . . . This neglect is so general that there is scarcely an institution to be found in the country where the English tongue is taught regularly from its elements to its pure and regular construction in prose and verse. Perhaps in most schools boys are taught the definition of the parts of speech, and a few hard names which they do not understand, and which the teacher seldom attempts to explain; this is called learning grammar. . . . The principles of any science afford pleasure to the student who comprehends them. In order to render the study of language agreeable, the distinctions between words should be illustrated by the difference in visible objects. Examples should be presented to the senses which are the inlets of all our knowledge.

"Another error which is frequent in America, is that a master undertakes to teach many different branches in the same school. In new settlements, where the people are poor, and live in scattered situations, the practice is often unavoidable. But in populous towns it must be considered as a defective plan of education. For suppose the teacher to be equally master of all the branches which he attempts to teach, which seldom happens, yet his attention must be distracted with a multiplicity of objects, and consequently painful to himself, and not useful to his pupils. Add to this the continual interruptions which the students of one branch suffer from those of another, which must retard the progress of the whole school. It is a much more eligible plan to appropriate an apartment to each branch of education, with a teacher who makes that branch his sole employment. . . . Indeed what is now called a liberal education disqualifies a man for business. Habits are formed in youth and by practice; and as business is in some measure mechanical, every person should be exercised in his employment in an early period of life, that his habits may be formed by the time his apprenticeship expires. An education in a university interferes with the forming of these habits, and perhaps forms opposite habits; the mind may contract a fondness for ease, for pleasure, or for books, which no efforts can overcome. An academic education, which should furnish the youth with some ideas of men and things, and leave time for an apprenticeship before the age of twenty-one years,

would be the most eligible for young men who are designed for active employments.

* * * * *

"But the principal defect in our plan of education in America is the want of good teachers in the academies and common schools. By good teachers I mean men of unblemished reputation, and possessed of abilities competent to their station. That a man should be master of what he undertakes to teach is a point that will not be disputed; and yet it is certain that abilities are often dispensed with, either through inattention or fear of expense. To those who employ ignorant men to instruct their children, let me say, it is better for youth to have no education than to have a bad one; for it is more difficult to eradicate habits than to impress new ideas. The tender shrub is easily bent to any figure; but the tree which has acquired its full growth resists all impressions. Yet abilities are not the sole requisites. The instructors of youth ought, of all men, to be the most prudent, accomplished, agreeable, and respectable. What avail a man's parts, if, while he is 'the wisest and brightest,' he is the 'meanest of mankind?' The pernicious effects of bad example on the minds of youth will probably be acknowledged; but, with a view to improvement, it is indispensably necessary that the teachers should possess good breeding and agreeable manners. In order to give full effect to instructions it is requisite that they should proceed from a man who is loved and respected. But a low-bred clown or morose tyrant can command neither love nor respect; and that pupil who has no motive for application to books but the fear of the rod, will not make a scholar."

LETTER FROM REV. HEMAN HUMPHREY, D.D.

"PITTSFIELD, Dec. 12th, 1860.

"HON. HENRY BARNARD: *Dear Sir*—I am glad to hear from you, still engaged in the educational cause, and that you are intending to 'give a picturesque survey of the progress of our common schools, their equipment, studies and character.' If my early recollections and experience will give you any little aid, I shall esteem myself happy in affording it.

"The first school I remember was kept a few weeks by a maiden lady, called Miss Faithy, in a barn. I was very young, as were most of the children. What I learned

then, if any thing, I have forgotten. This was in the summer, of course. The next was a school, so called, kept a month or two by a neighbor of ours, who was the best *trout fisher*, with his horse-hair line, in all those parts. He wrote a fair hand, as I remember, on birch bark. What he taught us, but to say *tue* and *due*, has escaped my recollection. We had no school-house then in our district, and we met as much for play as any thing, where we could find shelter. The next winter, another neighbor took us a few weeks into one of the rooms of his own house, where every thing but learning was going on. His speech bewrayed him of Rhode Island origin, and whatever he knew, he certainly could never have had much if any chance of being whipped in school when he was a boy. I remember his tremendous *stamp* when we got noisy in school-time, and that is all. This, however, is not a fair sample of school accommodations in my boyhood; and I had a better chance for two or three winters afterward.

"SCHOOL HOUSES.—Most of the other districts in the town had school-houses, but not all. The first winter that I kept school myself, was in a room next to the kitchen in a small private house. Some of the school-houses were better than others; but none of them in that or the adjoining towns were convenient or even comfortable. They were rather *juvenile penitentiaries*, than attractive accommodations for study. They were too small, and low from the ceiling to the floor, and the calculation of the builders seemed to have been, to decide into how small a space the children could be crowded, from the fire-place till the room was well packed. Not unfrequently sixty or seventy scholars were daily shut up six hours, where there was hardly room for thirty. The school-houses were square, with a very narrow entry, and a large fire-place on the side near the door. There were no stoves then. They were generally roughly clapboarded, but never painted. They had writing-desks, or rather, long boards for writing, on two or three sides, next to the wall. The benches were all loose; some of them boards, with slabs from the saw-mill, standing on four legs, two at each end. Some were a little lower than the rest, but many of the smaller children had to sit all day with their legs dangling between the bench and the floor. Poor little things! nodding and trying to keep their balance on the slabs, without any

backs to lean against, how I pity them to this day. In the coldest weather, it was hard to tell which was the most difficult, to keep from roasting or freezing. For those nearest to the fire it was sweltering hot, while the ink was freezing in the pens on the back side of the room. '*Master*, I am too hot!'—'*Master*, may I go to the fire?' That was the style of address in those days, and we did our best to be *masters*, anyhow.

"All the school-houses that I remember stood close by the travelled road, without any play-grounds or enclosures whatever. If there were any shade trees planted, or left of spontaneous growth, I have forgotten them. And in most cases, there were no outside accommodations, even the most necessary for a moment's occasion. I now marvel at it, but so it was. In that respect, certainly, the days of the children are better than the days of their fathers were.

"For the most part, the winter schools were miserably supplied with wood. I kept school myself in three towns, and in but one of the schools was there any wood-shed whatever; and no wood was got up and seasoned in summer against winter. Most of what we used was standing in the forests when the school began, and was cut and brought sled length by the farmers in proportion to the number of scholars which they sent. Not exactly that, either; for sometimes, when we went to the school-house in a cold morning, there was *no wood* there. Somebody had neglected to bring his load, and we were obliged to adjourn over to the next day. In many cases, the understanding was, that the larger boys must cut the wood as it was wanted. It always lay in the snow, and sometimes the boys were sent to dig it out in school-time, and bring it in, all wet and green as it was, to keep us from freezing. That was the fuel to make fires with in the morning, when the thermometer was below zero, and how the little children cried with the cold, when they came almost frozen, and found no fire burning; nothing but one or two boys blowing and keeping themselves warm as well as they could, by exercise, in trying to kindle it. Such were our school-houses and their disaccommodations.

"BRANCHES TAUGHT IN THE SCHOOLS.—They were reading, spelling, and writing, besides the A B C's to children scarcely four years old, who ought to have been at home with their mothers. They were called up

twice a day by the master pointing with his penknife 'What's that?' 'A.' 'What's that?' 'D.' 'No, it's B.' 'What's that?' 'N.' 'No, you careless boy, it's C;' and so down to *ezand*. 'Go to your seat, you will never learn your lesson in the world, at this rate.' Our school-books were the Bible, 'Webster's Spelling Book,' and 'Third Part,' mainly. One or two others were found in some schools for the reading classes. Grammar was hardly taught at all in any of them, and that little was confined almost entirely to committing and reciting the rules. Parsing was one of the occult sciences in my day. We had some few lessons in geography, by questions and answers, but no maps, no globes; and as for *black-boards*, such a thing was never thought of till long after. Children's reading and picture books, we had none; the fables in Webster's Spelling Book came nearest to it. Arithmetic was hardly taught at all in the day schools. As a substitute, there were some evening schools in one of the districts. Spelling was one of the leading daily exercises in all the classes, and it was better, a good deal, I think, than it is now.

"The winter schools were commonly kept about three months; in some favored districts *four*, but rarely as long. As none of what are now called the higher branches were taught beyond the merest elements, parents generally thought that three or four months was enough. There were no winter *select* schools for the young above the age of sixteen or seventeen, as I remember, till after I retired from the profession, such as it then was. There may have been here and there an academy, in some parts of the state; but not one within the range of my acquaintance.

"OUR SPRING EXHIBITIONS.—At the close of the winter schools we had what we used to call our *Quarter-days*, when the schools came together in the meeting-house, with a large congregation of parents and friends. The public exercises were reading, spelling, and speaking single pieces, and dialogues. Some of the dialogues we wrote ourselves, for our own schools. Most of them were certainly very flat; but they brought down the house, and answered the purpose as well as any we could pick up. We thought then, as I think now, that those quarter-days were of great advantage to the schools. The anticipation of them kept up an interest all winter, and stimulated both teachers and

scholars to do their best in the way of preparation. As the time approached, we had evening schools for reading and rehearsing the dialogues, so as to be sure not to fall behind in the exhibitions. None of our college commencements are now looked forward to with greater interest than were those vernal anniversaries.

"Another thing that helped us a good deal was the occasional afternoon visits of the parents and other friends of the schools. They came in by invitation, or whenever they chose, and their visits always did us good.

"Still another practice we found to be quite stimulating and useful. We had a mutual understanding that, without giving any notice, any teacher might dismiss his own school for an afternoon, and, taking along with him some of the older boys, call in to see how his brother teacher got along in the next or some other district. The arrangement worked well. We made speeches, complimented one another as politely as circumstances would allow, and went home resolved not to fall behind the best of them.

"In the school, we made up our minds to be masters, in *fact* as well as in name. Though of late years I have not had very good advantages for making the comparison, I believe the schools were quite as well governed sixty years ago as they are now. Among other things which we did to maintain our authority, was to go out now and then and have a snowball skirmish with the boys, and though we commonly got beat, nothing we could do was more effectual.

"*Corporal* punishments, I believe, were sparingly resorted to in most of our schools. Though I myself believed in Solomon fully, I never flogged but one scholar in my life, though I shook the mischief out of a great many. I think Sam was of the opinion, in the premises, that the rod was laid on rather smartly, for I understood he promised, some day, to pay me in kind, which, however, I suppose he never found it quite convenient to undertake.

"We schoolmasters within convenient distances used to meet in the winter evenings for mutual improvement, which, to own the truth, we needed a good deal. Our regular exercises were reading for criticisms, reporting how we were getting along, and conversing upon the best method of managing our schools. This was very profitable, as we thought, to us all.

"In those ancient times, it was an almost universal custom in the rural towns of Connecticut, for the teachers to *board round*, and upon the whole I liked it. It was a good school for us. By going into all the families we learned a great deal. We were looked upon as having more in our heads than we could fairly claim, and they always kept us on the best they had. It is true, the cooking was not always the best, nor sheets always so clean as to guard against infection; and if, perchance, it sometimes broke out, we knew how to cure it.

"Our wages were generally screwed down to the lowest notch by the school committees, under the instruction of the districts. For my first campaign I received *seven* dollars a month and board; for the next, *nine*; for the third, *ten*; and I think I never went above thirteen till quite the last of my teaching before I went to college. As I had some reputation in that line, I suppose I was as well paid as my brethren.

"With regard to the summer schools of that period, I have very little to say. They were kept by females upon very low wages, about as much a week as they could earn in families by spinning or weaving. They took good care of the little children, and taught them as well as they could.

"As we had no grammar schools in which the languages were taught, we most of us fitted for college with our ministers, who, though not very fresh from their classics, did what they could to help us.

"Finally, you ask me whether there were any schools for young ladies in those old times? There may possibly have been in two or three of the largest towns, but the only one of which I had any knowledge was in Litchfield, kept by Miss Pierce, and I am not quite sure that her school was established as early as your question contemplates.

"These, dear sir, are some of my old remembrances, which you may make such use of as you please.

"Respectfully yours,

"H. HUMPHREY."

LETTER FROM HON. JOSEPH T. BUCKINGHAM.

"CAMBRIDGE, Dec. 10th, 1860.

"HENRY BARNARD, Esq.: *My Dear Sir*—I cheerfully comply with your request to give you some account of the schools and the educational books that were in use about

the close of the last century. I never had the privilege of attending any higher institution of learning than the common district schools of Connecticut, in the town of Windham; but I have no doubt that those of that town were a fair type of many others, probably most of them, except such as were kept in the larger towns or thickly populated villages.

"According to the best of my remembrance, my school-days began in the spring of 1783. The school to which I was admitted was kept by a lady, and, like most of the district schools, was kept only for the younger pupils, and was open for two months during the summer season. The upper class in the school was formed entirely of females—such as could read in the Bible. The lower classes read in spelling books and the New England Primer. The spelling books, of which there were not, probably, more than three or four in the school, I believe were all by Dilworth, and were much worn and defaced, having been a sort of heir-loom in the families of the pupils. The teacher of this school was the daughter of the minister of the parish. She kept a rod hanging on the wall behind her chair and a ferule on the table by her side; but I do not recollect that she used either of them. The girls who constituted the first class were required, every Monday morning, to repeat the text or texts of the preceding day's discourse, stating the book, chapter, and verse whence it was taken. The next summer, 1784, the same lady, or one of her sisters, kept school in the same district. The same books were in use, and there was the same routine of exercises. It was kept on the first floor of the steeple. The lower end of the bell-rope lay in a coil in the centre of the floor. The discipline was so strict, that no one, however mischievously disposed, I believe ever thought of taking hold of it, though it was something of an incumbrance. I was then four years and a half old, and had learned *by heart* nearly all the reading lessons in the Primer, and much of the Westminster Catechism, which was taught as the closing exercise every Saturday. But justice to one of the best of mothers requires that I should say that much the greater part of the improvement I had made was acquired from her careful instruction.

"In December, 1784, the month in which I was five years old, I attended, for a few days, the school kept by a master—I do not remember his name. When asked up for

examination, he asked me if I could read without spelling? I said I could read in the Bible. He hesitated a moment, and then placed me on one of the benches, opened a Bible at the fifth chapter of Acts, and asked me to read. I read ten or a dozen verses—being the account of Ananias and his wife falling dead before Peter for telling a lie. Whether he had any suspicion that I had told a falsehood, and took this method to reprove me, I know not; but he dismissed me with approbation. He used his ferule on the hands of some of the elder boys; but the severest punishment that he inflicted for any violation of order, was compelling a boy who had brought into the school the breast-bone of a chicken, (commonly called the *wishing-bone*), and with which he had excited some noise among the pupils, to stand on one of the benches and wear the bone on his nose till the school was dismissed. I am strongly impressed with the belief that Webster's spelling book made its first appearance in the schools during this winter. The following summer I attended, but very irregularly, a school kept as before in the steeple of the meeting-house,* and had a copy of Webster. Whether there were any other copies in the school or not I am not able to say. The next two winters, circumstances which I have no desire to recall, and which you would not care to be acquainted with, prevented my attending any school. In the summer of 1786, these same circumstances caused me to be removed to another district three miles distant from the central village. The farmer with whom I lived thought I could read well enough, and as the district school-house was a mile or more distant, he considered it unnecessary to send me that distance in the winter, merely to read; and consequently for two or three winters I went to school not more than eight or ten days in each. At length, in 1790 or 1791, it was thought I was old enough to learn to *cipher*, and accordingly was permitted to go to school more constantly. I told the master I wanted to learn to cipher. He set me a *sum* in simple addition—*five columns* of figures, and *six figures* in each column. All the instruction he gave me was—add the figures in the first column, carry one for every ten, and set the overplus down under the column. I supposed he meant by the *first* column the left hand

column; but what he meant by carrying one for every ten was as much a mystery as Samson's riddle was to the Philistines. I worried my brains an hour or two, and showed the master the figures I had made. You may judge what the amount was, when the columns were added from left to right. The master frowned and repeated his former instruction—add up the column *on the right*, carry one for every ten, and set down the remainder. Two or three afternoons (I did not go to school in the morning) were spent in this way, when I begged to be excused from learning to cipher, and the old gentleman with whom I lived thought it was time wasted; and if I attended the school any further at that time, reading and spelling, and a little writing were all that was taught. The next winter there was a teacher more communicative and better fitted for his place, and under him some progress was made in arithmetic, and I made a tolerable acquisition in the first four rules, according to Dilworth's Schoolmaster's Assistant, of which the teacher and one of the eldest boys had each a copy. The two following winters, 1794 and 1795, I mastered all the rules and examples in the first part of Dilworth; that is, through the various chapters of Rule of Three, Practice, Fellowship, Interest, etc. etc., to Geometrical Progression and Permutation.

"In our district, the books were of rather a miscellaneous character, such as had been in families perhaps half a century or more. My belief is that Webster's Spelling Book was not in general use before 1790 or 1791. The Bible was read by the first class in the morning, always, and generally in the afternoon before the closing exercise, which was always a lesson in spelling, and this was performed by all the pupils who were sufficiently advanced to pronounce distinctly words of more than one syllable. It was the custom for all such pupils to stand together as one class, and with *one voice* to read a column or two of the tables for spelling. The master gave the signal to begin, and all united to read, letter by letter, pronouncing each syllable by itself, and adding it to the preceding one till the word was complete. Thus, a-d ad, m-i mi, ad-mi, r-a ra, ad-mira, t-i-o-n shun, admiration. This mode of reading was exceedingly exciting, and, in my humble judgment, exceedingly useful; as it required and taught deliberate and distinct articulation, and inspired the youngest with a desire

* This was the last time I went to a *summer* school.

to equal the older ones. It is true the voices would not all be in perfect unison; but after a little practice they began to assimilate. I have heard a class of thirty or more read column after column in this manner, with scarcely a perceptible variation from the proper pitch of voice. When the lesson had been thus read, the books were closed, and the words given out for spelling. If one was misspelt, it passed on to the next, and the next pupil in order, and so on till it was spelt correctly. Then the pupil who had spelt correctly went up in the class *above* the one who had misspelt. It was also a practice, when one was absent from this exercise in spelling, that he should stand at the foot of the class when he returned. Another of our customs was to choose sides to spell once or twice a week. The words to be spelt went from side to side; and at the conclusion, the side which *beat* (spelt the most words) were permitted to leave the schoolroom, preceding the other side, who had to sweep the room and build the fires the next morning. These customs prevalent sixty and seventy years ago excited emulation, and emulation produced improvement. A revival of them, I have no doubt, would be advantageous in the common schools, especially where pupils are required to spell words given out indiscriminately from a reading book or dictionary. There was not, to my knowledge, any *reading book* proper, except the Bible, till Webster's Third Book, so called, came out about 1793 or 1794. A new edition of his spelling book furnished some new matter for reading—selections from the New Testament, a chapter of Proverbs, and a set of Tables, etc.; but none of these operated to the exclusion of the Bible.

"In the family in which I lived there were three or four old spelling books, which I presume had been used in schools before the period of my remembrance. One of these was a book of less than a hundred pages, printed in London, I think in 1690. The words were arranged in tables according to syllables. The terminations *tion, sion, cial, tial, etc.*, were all divided and printed as two distinct syllables. (And I believe this mode of printing is still continued in England. It was in the time of Lindley Murray, as may be seen in his spelling book, printed about forty years ago.) This spelling book contained a numeration table which, from a singular feature, early attracted my attention.

Every figure was 9, and the whole formed a curious triangle. Thus:

9
99
999 and so on to

the last, 999,999,999

"Another spelling book in our farmer's library was by Daniel Fenning, printed in London. It contained a short treatise on grammar, on which I sometimes exercised my memory, but understood not one of its principles. We had also a Dilworth, containing certain fables—such as Jupiter and the Frogs, the Romish Priest and the Jester, Hercules and the Wagoner, etc., etc. Another still we had, the author of which I never knew, as several pages had been lost from the beginning. It had a page of proverbs, one of which—'a cat may look upon a king'—occasioned me much thoughtful exercise. It also had an appropriate collection of couplets for writing-copies, of which the only one I recollect was this:

"X things a penman should have near at hand—
Paper, pounce, pen, ink, knife, hone, rule, plummet, wax, sand."

But that which rendered the book so memorable as never to be forgotten, was the astonishing, if not terrific, word of fourteen syllables—'Ho-no-ri-fi-ca-bi-li-tu-di-ni-tu-ti-bus-que'—asserted to be the longest word in the English language.

"In the winter of 1793-4, we had for a teacher ERASTUS RIPLEY, who was an under-graduate of Yale College. I mention his name, because I cannot look back upon the time when I had the advantage of his instruction without a feeling of reverence for the man and respect for the teacher. I learned more from him than all the school-masters I had been under. He took more pains to instruct us in reading than all his predecessors within my knowledge. He opened the school every morning with prayer—which had not been practised in our district. He was preparing for the ministry, and was afterwards settled at Canterbury, I think. He was highly esteemed by all the people of the district, and gave such an *impetus* to the ambition of the pupils, that a subscription was made to employ him an extra month after the usual term of the school had expired.

"Mr. Ripley was succeeded in the winter of 1794-5 by a young man from Lebanon by the name of Tisdale, under whom my

school days were finished; and here I may bring this long and, I fear, very uninteresting letter to a close. Hoping this may serve the purpose for which you suggested the writing of it, and wishing you all the success you can desire in the noble cause in which you are engaged,

"I am, very respectfully

"And truly yours,

"JOSEPH T. BUCKINGHAM."

LETTER FROM REV. ELIPHALET NOTT, D.D.,
DATED JAN., 1861.

"When I was a boy, seventy-five or eighty years ago, in good old Puritan Connecticut, it was *felt* as a practical maxim 'that to spare the rod was to spoil the child;' and on this maxim the pedagogue acted in the school-room, and applied it for every offence, real or imaginary; and for having been whipped at school by the relentless master, the unfortunate tyro was often whipped at home by his no less relentless father; so that between the two relentless executors of justice among the Puritan fathers, few children, I believe, were spoiled by the withholding of this orthodox discipline. For myself, I can say (and I do not think I was wayward beyond the average of district school-boys) that, in addition to warnings, and admonitions daily, if I was not whipped more than three times a week, I considered myself for the time peculiarly fortunate.

"Being of a contemplative and forbearing disposition, this discipline of the rod became peculiarly irksome to me, and, as I thought, unjustifiable; and I formed a resolution, if I lived to be a man, I would not be like other men in regard to their treatment of children.

"Through the mercy of God I did live to be a man, and when at the age of eighteen I became installed as master of a district school in the eastern part of Franklin, Connecticut—a school where rebellious spirits had previously asserted their rights, and been subdued or driven from the school by the use of the rod—nothing daunted, I made up my mind to substitute in my school moral motives in the place of the rod; and I frankly told my assembled pupils so, and that if they would have the generosity to second my efforts, they would secure to themselves and furnish me and their parents the happiness which is the heaven-appointed reward of well-doing.

"The school responded to my appeal, and

thereafter, though we played and gambolled together as equals in play-hours, and on Saturday afternoons, which were also devoted to play, the moment we entered the school-room, a subordination and application to study was observable, that became matter of remark and admiration among the inhabitants of the district, the fame of which success extended to other districts, and even to adjoining towns, so that the examination and exhibition with which the school closed the ensuing spring, called together clergymen and other officials from places quite remote.

"This success brought me to the knowledge of the trustees of the Plainfield Academy, one of the most important, if not at the time the most important academy in the state, and I was by a unanimous vote appointed principal of said academy—an institution in which several hundred children of both sexes were in the same building successfully taught and governed, for years, without the use of the rod, it being at that time the prevailing usage, both in district schools and academies, for the two sexes to be taught in the same room, and subjected to the same form of government.

"This successful experiment in the use of moral suasion, and other kindred and kindly influences, in place of the rod, led to other and kindred experiments, until, whether for the better or the worse, the rod at length came to occupy a very subordinate place in the system of school education.

"In those days, education in common schools was not so diffusive as at the present day; but quite as thorough, if not more so. The same remark may be applied to the higher schools or academies—the whole field of natural science being at that time, for the most part, unexplored; but mathematics and classics were zealously taught. In evidence of this, though inferior in attainments to some of my classmates, I published successfully myself an almanac when about twenty-one years of age.

"As the rod in those days was the principal instrument in common school education, so when I was afterward called to Union College, fines, suspensions, and expulsions were the principal instruments of collegiate government. The faculty sat in their robes as a court, caused offenders to be brought before them, examined witnesses, heard defences, and pronounced sentences with the solemnity of other courts of justice; and though Union College had on its cata-

logue but a very diminutive number of students, the sitting of the faculty as a court occupied no inconsiderable part of the time of its president and professors.

"Soon after I became connected with the college as its president, a case of discipline occurred which led to the trial and issued in the expulsion of a student belonging to a very respectable family in the city of Albany. According to the charter of Union College, the sentence of the faculty is not final. An appeal can be taken to the board of trustees, and in the case in question an appeal was taken, and, after keeping college in confusion for months, by the different hearings of the case, the board reversed the decision of the faculty, and restored the young man. On the event of this restoration, I informed them that they should never, during my administration, have occasion to review another case of discipline by the faculty; and during the fifty-six years which have since passed away, I have kept my word; and though we have been less successful in our system of parental government than could be wished, we have had no rebellions, and it is conceded, I believe generally, that quite as large a proportion of our young men have succeeded in after life as of any other collegiate institution in the Union."

RECOLLECTIONS OF PETER PARLEY.

The following picture of the District School as it was a few years later, in the town of Ridgefield,* one of the most advanced agricultural communities of Connec-

* "Nearly all the inhabitants of Ridgefield were farmers, with the few mechanics that were necessary to carry on society in a somewhat primeval state. Even the persons not professionally devoted to agriculture, had each his farm, or at least his garden and home lot, with his pigs, poultry, and cattle. The population might have been 1200, comprising 200 families. All could read and write, but in point of fact, beyond the *Almanac* and *Watts' Psalms and Hymns*, their literary acquirements had little scope. There were, I think, four newspapers, all weekly, published in the state: one at Hartford, one at New London, one at New Haven, and one at Litchfield. There were, however, not more than three subscribers to all these in our village. We had, however, a public library of some 200 volumes, and what was of equal consequence—the town was on the road which was then the great thoroughfare, connecting Boston with New York, and hence it had means of intelligence from travellers constantly passing through the place, which kept it up with the march of events."

ticut, is from the pen of Peter Parley, in his "*Recollections of a Lifetime*."

"About three fourths of a mile from my father's house, on the winding road to Lower Salem, which bore the name of West Lane, was the school-house where I took my first lessons, and received the foundations of my very slender education. I have since been sometimes asked where I graduated: my reply has always been, 'At West Lane.' Generally speaking, this has ended the inquiry, whether because my interlocutors have confounded this venerable institution with 'Lane Seminary,' or have not thought it worth while to risk an exposure of their ignorance as to the college in which I was educated, I am unable to say.

"The site of the school-house was a triangular piece of land, measuring perhaps a rood in extent, and lying, according to the custom of those days, at the meeting of four roads. The ground hereabouts—as everywhere else in Ridgefield—was exceedingly stony, and in making the pathway the stones had been thrown out right and left, and there remained in heaps on either side, from generation to generation. All round was bleak and desolate. Loose, squat stone walls, with innumerable breaches, inclosed adjacent fields. A few tufts of elder, with here and there a patch of briars and poke-weed, flourished in the gravelly soil. Not a tree, however, remained, save an aged chestnut, at the western angle of the space. This certainly had not been spared for shade or ornament, but probably because it would have cost too much labor to cut it down, for it was of ample girth. At all events it was the oasis in our desert during summer; and in autumn, as the burrs disclosed its fruit, it resembled a besieged city. The boys, like so many catapults, hurled at it stones and sticks, until every nut had capitulated.

"Two houses only were at hand: one, surrounded by an ample barn, a teeming orchard, and an enormous wood-pile, belonged to Granther Baldwin; the other was the property of 'Old Chich-es-ter,' an uncouth, unsocial being, whom everybody for some reason or other seemed to despise and shun. His house was of stone and of one story. He had a cow, which every year had a calf. He had a wife—filthy, uncombed, and vaguely reported to have been brought from the old country. This is about the whole history of the man, so far as it is written in the authentic traditions of the parish. His

premises, an acre in extent, consisted of a tongue of land between two of the converging roads. No boy, that I ever heard of, ventured to cast a stone or to make an incursion into this territory, though it lay close to the school-house. I have often, in passing, peeped timidly over the walls, and caught glimpses of a stout man with a drab coat, drab breeches, and drab gaiters, glazed with ancient grease and long abrasion, prowling about the house; but never did I discover him outside of his own dominion. I know it was darkly intimated that he had been a tory, and was tarred and feathered in the revolutionary war, but as to the rest he was a perfect myth. Granther Baldwin was a character no less marked, but I must reserve his picture for a subsequent letter.

"The school-house itself consisted of rough, unpainted clapboards, upon a wooden frame. It was plastered within, and contained two apartments—a little entry, taken out of a corner for a wardrobe, and the school-room proper. The chimney was of stone, and pointed with mortar, which, by the way, had been dug into a honeycomb by uneasy and enterprising penknives. The fireplace was six feet wide and four feet deep. The flue was so ample and so perpendicular, that the rain, sleet, and snow fell direct to the hearth. In winter, the battle for life with green fizzling fuel, which was brought in sled lengths and cut up by the scholars, was a stern one. Not unfrequently, the wood, gushing with sap as it was, chanced to be out, and as there was no living without fire, the thermometer being ten or twenty degrees below zero, the school was dismissed, whereat all the scholars rejoiced aloud, not having the fear of the schoolmaster before their eyes.

"It was the custom at this place to have a woman's school in the summer months, and this was attended only by young children. It was, in fact, what we now call a primary or infant school. In winter, a man was employed as teacher, and then the girls and boys of the neighborhood, up to the age of eighteen, or even twenty, were among the pupils. It was not uncommon, at this season, to have forty scholars crowded into this little building.

"I was about six years old when I first went to school. My teacher was Aunt Delight, that is, Delight Benedict, a maiden lady of fifty, short and bent, of sallow complexion and solemn aspect. I remember the

first day with perfect distinctness. I went alone—for I was familiar with the road, it being that which passed by our old house. I carried a little basket, with bread and butter within, for my dinner, the same being covered over with a white cloth. When I had proceeded about half way, I lifted the cover, and debated whether I would not eat my dinner then. I believe it was a sense of duty only that prevented my doing so, for in those happy days I always had a keen appetite. Bread and butter were then infinitely superior to *paté de foie gras* now; but still, thanks to my training, I had also a conscience. As my mother had given me the food for dinner, I did not think it right to convert it into lunch, even though I was strongly tempted.

"I think we had seventeen scholars—boys and girls—mostly of my own age. Among them were some of my after companions. I have since met several of them—one at Savannah, and two at Mobile, respectably established, and with families around them. Some remain, and are now among the gray old men of the town; the names of others I have seen inscribed on the tombstones of their native village. And the rest—where are they?

"The school being organized, we were all seated upon benches, made of what were called *slabs*—that is, boards having the exterior or rounded part of the log on one side: as they were useless for other purposes, these were converted into school-benches, the rounded part down. They had each four supports, consisting of straddling wooden legs, set into auger holes. Our own legs swayed in the air, for they were too short to touch the floor. Oh, what an awe fell over me, when we were all seated and silence reigned around!

"The children were called up, one by one, to Aunt Delight, who sat on a low chair, and required each, as a preliminary, to make his manners, consisting of a small sudden nod or jerk of the head. She then placed the spelling-book—which was Dilworth's—before the pupil, and with a buck-handled penknife pointed, one by one, to the letters of the alphabet, saying, 'What's that?' If the child knew his letters the 'What's that?' very soon ran on thus:

"'What's that?'

"'A.'

"'Stha-a-t?'

"'B.'

“ ‘Sna-a-a-t?’

“ ‘(’

“ ‘Sna-a-a-t?’

“ ‘D.’

“ ‘Sna-a-a-t?’

“ ‘E.’ &c.

“I looked upon these operations with intense curiosity and no small respect, until my own turn came. I went up to the school-mistress with some emotion, and when she said, rather spitefully, as I thought, ‘Make your obeisance!’ my little intellects all fled away, and I did nothing. Having waited a second, gazing at me with indignation, she laid her hand on the top of my head, and gave it a jerk which made my teeth clash. I believe I bit my tongue a little; at all events, my sense of dignity was offended, and when she pointed to A, and asked what it was, it swam before me dim and hazy, and as big as a full moon. She repeated the question, but I was doggedly silent. Again, a third time, she said, ‘What’s that?’ I replied: ‘Why don’t you tell me what it is? I didn’t come here to learn you your letters!’ I have not the slightest remembrance of this, for my brains were all a-wool-gathering; but as Aunt Delight affirmed it to be a fact, and it passed into tradition, I put it in. I may have told this story some years ago in one of my books, imputing it to a fictitious hero, yet this is its true origin, according to my recollection.

“What immediately followed I do not clearly remember, but one result is distinctly traced in my memory. In the evening of this eventful day, the school-mistress paid my parents a visit, and recounted to their astonished ears this, my awful contempt of authority. My father, after hearing the story, got up and went away; but my mother, who was a careful disciplinarian, told me not to do so again! I always had a suspicion that both of them smiled on one side of their faces, even while they seemed to sympathize with the old petticoat and penknife pedagogue, on the other; still I do not affirm it, for I am bound to say, of both my parents, that I never knew them, even in trifles, say one thing while they meant another.

“I believe I achieved the alphabet that summer, but my after progress, for a long time, I do not remember. Two years later I went to the winter-school at the same place, kept by Lewis Olmstead—a man who had a call for plowing, mowing, carting manure,

etc., in summer, and for teaching school in the winter, with a talent for music at all seasons, wherefore he became chorister upon occasion, when, peradventure, Deacon Hawley could not officiate. He was a celebrity in ciphering, and ‘Squire Seymour declared that he was the greatest ‘arithmeticker’ in Fairfield county. All I remember of his person is his hand, which seemed to me as big as Goliath’s, judging by the claps of thunder it made in my ears on one or two occasions.

“The next step of my progress which is marked in my memory, is the spelling of words of two syllables. I did not go very regularly to school, but by the time I was ten years old I had learned to write, and had made a little progress in arithmetic. There was not a grammar, a geography, or a history of any kind in the school. Reading, writing, and arithmetic were the only things taught, and these very indifferently—not wholly from the stupidity of the teacher, but because he had forty scholars, and the standards of the age required no more than he performed. I did as well as the other scholars, certainly no better. I had excellent health and joyous spirits; in leaping, running, and wrestling, I had but one superior of my age, and that was Stephen Olmstead, a snug-built fellow, smaller than myself, and who, despite our rivalry, was my chosen friend and companion. I seemed to live for play: alas! how the world has changed since I have discovered that we live to agonize over study, work, care, ambition, disappointment, and then —?

“As I shall not have occasion again, formally, to introduce this seminary into my narrative, I may as well close my account of it now. After I had left my native town for some twenty years, I returned and paid it a visit. Among the monuments that stood high in my memory was the West Lane school-house. Unconsciously carrying with me the measures of childhood, I had supposed it to be at least thirty feet square; how had it dwindled when I came to estimate it by the new standards I had formed! It was in all things the same, yet wholly changed to me. What I had deemed a respectable edifice, as it now stood before me was only a weather-beaten little shed, which, upon being measured, I found to be less than twenty feet square. It happened to be a warm, summer day, and I ventured to enter the place. I found a girl,

some eighteen years old, keeping 'a ma'am school' for about twenty scholars, some of whom were studying Parley's Geography. The mistress was the daughter of one of my schoolmates, and some of the boys and girls were grandchildren of the little brood which gathered under the wing of Aunt Delight, when I was an a-b-c-darian. None of them, not even the school-mistress, had ever heard of me. The name of my father, as having ministered unto the people of Ridgefield in some bygone age, was faintly traced in their recollection. As to Peter Parley, whose Geography they were learning—they supposed him some decrepit old gentleman hobbling about on a crutch, a long way off, for whom, nevertheless, they had a certain affection, inasmuch as he had made geography into a story-book. The frontispiece-picture of the old fellow, with his gouty foot in a chair, threatening the boys that if they touched his tender toe, he would tell them no more stories, secured their respect, and placed him among the saints in the calendar of their young hearts. Well, thought I, if this goes on I may yet rival Mother Goose!

"At the age of ten years I was sent to the up-town school, the leading seminary of the village, for at this period it had not arrived at the honor of an academy, the institution being then, and many years after, under the charge of Master Stebbins. He was a man with a conciliating stoop in the shoulders, a long body, short legs, and a swaying walk. He was, at this period, some fifty years old, his hair being thin and silvery, and always falling in well-combed rolls over his coat-collar. His eye was blue, and his dress invariably of the same color. Breeches and knee-buckles, blue-mixed stockings, and shoes with bright buckles, seemed as much a part of the man as his head and shoulders. On the whole, his appearance was that of the middle-class gentleman of the olden time, and he was in fact what he seemed.

"This seminary of learning for the rising aristocracy of Ridgefield was a wooden edifice, thirty by twenty feet, covered with brown clapboards, and, except an entry, consisted of a single room. Around and against the walls ran a continuous line of seats, fronted by a continuous writing-desk. Beneath, were depositories for books and writing materials. The centre was occupied by slab seats, similar to those of West Lane. The larger scholars were ranged on the outer sides, at

the desks; the smaller fry of a-b-c-darians were seated in the centre. The master was enshrined on the east side of the room, contrary, be it remembered, to the law of the French savans, which places dominion invariably in the west. Regular as the sun, Master Stebbins was in his seat at nine o'clock, and the performances of the school began.

"According to the Catechism—which, by the way, we learned and recited on Saturday—the chief end of man was to glorify God and keep his commandments: according to the routine of this school, one would have thought it to be reading, writing, and arithmetic, to which we may add spelling. From morning to night, in all weathers, through every season of the year, these exercises were carried on with the energy, patience, and perseverance of a manufactory.

"Master Stebbins respected his calling: his heart was in his work; and so, what he pretended to teach, he taught well. When I entered the school, I found that a huge stride had been achieved in the march of mind since I had left West Lane. Webster's Spelling Book had taken the place of Dilworth, which was a great improvement. The drill in spelling was very thorough, and applied every day to the whole school. I imagine that the exercises might have been amusing to a stranger, especially as one scholar would sometimes go off in a voice as grum as that of a bull-frog, while another would follow in tones as fine and piping as a peet-weet. The blunders, too, were often ineffably ludicrous; even we children would sometimes have tittered, had not such an enormity been certain to have brought out the birch. As to rewards and punishments, the system was this: whoever missed went down; so that perfection mounted to the top. Here was the beginning of the up and down of life.

"Reading was performed in classes, which generally plodded on without a hint from the master. Nevertheless, when Zeek Sanford—who was said to have a streak of lightning in him—in his haste to be smart, read the 37th verse of the 2d chapter of the Acts—'Now when they heard this, they were *pickled* in their heart'—the birch stick on Master Stebbins's table seemed to quiver and peel at the little end, as if to give warning of the wrath to come. When Orry Keeler—Orry was a girl, you know, and not a boy—drawled out in spelling: k—o—n,

kon, s—h—u—n—t—s, *shunts*, *konshunts*—the bristles in the master's eyebrows fidgeted like Aunt Delight's knitting-needles. Occasionally, when the reading was insupportably bad, he took a book and read himself, as an example.

"We were taught arithmetic in Daboll, then a new book, and which, being adapted to our measures of length, weight, and currency, was a prodigious leap over the head of poor old Dilworth, whose rules and examples were modelled upon English customs. In consequence of the general use of Dilworth in our schools, for perhaps a century—pounds, shillings, and pence were classical, and dollars and cents vulgar, for several succeeding generations. 'I would not give a penny for it,' was genteel; 'I would not give a cent for it,' was plebeian. We have not yet got over this: we sometimes say *red cent* in familiar parlance, but it can hardly be put in print without offence.

"Master Stebbins was a great man with a slate and pencil, and I have an idea that we were a generation after his own heart. We certainly achieved wonders according to our own conceptions, some of us going even beyond the Rule of Three, and making forays into the mysterious region of Vulgar Fractions. Several daring geniuses actually entered and took possession.

"But after all, penmanship was Master Stebbins's great accomplishment. He had no magniloquent system; no pompous lessons upon single lines and bifid lines, and the like. The revelations of inspired copy-book makers had not then been vouchsafed to man. He could not cut an American eagle with a single flourish of a goose-quill. He was guided by good taste and native instinct, and wrote a smooth round hand, like copper-plate. His lessons from A to Z, all written by himself, consisted of pithy proverbs and useful moral lessons. On every page of our writing-books he wrote the first line himself. The effect was what might have been expected—with such models, patiently enforced, nearly all became good writers.

"Beyond these simple elements, the Uptown school made few pretensions. When I was there, two Webster's Grammars and one or two Dwight's Geographies were in use. The latter was without maps or illustrations, and was in fact little more than an expanded table of contents, taken from Morse's Universal Geography—the mam-

moth monument of American learning and genius of that age and generation. The grammar was a clever book; but I have an idea that neither Master Stebbins nor his pupils ever fathomed its depths. They floundered about in it, as if in a quagmire, and after some time came out pretty nearly where they went in, though perhaps a little obfuscated by the dim and dusky atmosphere of these labyrinths.

"The fact undoubtedly is, that the art of teaching, as now understood, beyond the simplest elements, was neither known nor deemed necessary in our country schools in their day of small things. Repetition, drilling, line upon line, and precept upon precept, with here and there a little of the birch—constituted the entire system.

"Let me here repeat an anecdote, which I have indeed told before, but which I had from the lips of its hero, G... H..., a clergyman of some note thirty years ago, and which well illustrates this part of my story. At a village school, not many miles from Ridgefield, he was put into Webster's Grammar. Here he read, '*A noun is the name of a thing—as horse, hair, justice.*' Now in his innocence, he read it thus: '*A noun is the name of a thing—as horse-hair justice.*'

"'What then,' said he, ruminating deeply, 'is a noun? But first I must find out what a horse-hair justice is.'

"Upon this he meditated for some days, but still he was as far as ever from the solution. Now his father was a man of authority in those parts, and moreover he was a justice of the peace. Withal, he was of respectable ancestry, and so there had descended to him a somewhat stately high-backed settee, covered with horse-hair. One day, as the youth came from school, pondering upon the great grammatical problem, he entered the front door of the house, and there he saw before him, his father, officiating in his legal capacity, and seated upon the old horse-hair settee. 'I have found it!' said the boy to himself, as greatly delighted as was Archimedes when he exclaimed *Eureka*—'my father is a horse-hair justice, and therefore a noun!'

"Nevertheless, it must be admitted that the world got on remarkably well in spite of this narrowness of the country schools. The elements of an English education were pretty well taught throughout the village seminaries of Connecticut, and I may add,

of New England. The teachers were heartily devoted to their profession: they respected their calling, and were respected and encouraged by the community. They had this merit, that while they attempted but little, that, at least, was thoroughly performed.

"As to the country at large, it was a day of quiet, though earnest action: Franklin's spirit was the great 'schoolmaster abroad'—teaching industry, perseverance, frugality, and thrift, as the end and aim of ambition. The education of youth was suited to what was expected of them. With the simple lessons of the country schools, they moved the world immediately around them. Though I can recollect only a single case—that already alluded to of Ezekiel Sanford—in which one of Master Stebbins's scholars attained any degree of literary distinction, still, quite a number of them, with no school learning beyond what he gave them, rose to a certain degree of eminence. His three sons obtained situations in New York as accountants, and became distinguished in their career. At one period there were three graduates of his school, who were cashiers of banks in that city. My mind adverts now with great satisfaction to several names among the wealthy, honorable, and still active merchants of the great metropolis, who were my fellow-students of the Up-town school, and who there began and completed their education."

To the advantages, such as they were, of the district school, Mr. Goodrich adds an account of his experience on the farm, and his juvenile sports, as well as his early attempts at *whittling* and other mechanical arts, and adds the following reflections:—

"Now all these things may seem trifles, yet in a review of my life, I deem them of some significance. This homely familiarity with the more mechanical arts was a material part of my education; this communion with nature gave me instructive and important lessons from nature's open book of knowledge. My technical education, as will be seen hereafter, was extremely narrow and irregular. This defect was at last partially supplied by the commonplace incidents I have mentioned. The teaching, or rather the training of the senses, in the country—ear and eye, foot and hand, by running, leaping, climbing over hill and mountain, by occasional labor in the garden and on the farm, and by the use of tools—and all this in youth,

is sowing seed which is repaid largely and readily to the hand of after cultivation, however unskilful it may be. This is not so much because of the amount of knowledge available in after-life, which is thus obtained—though this is not to be despised—as it is that healthful, vigorous, manly habits and associations—physical, moral, and intellectual—are thus established and developed.

"It is a riddle to many people that the emigrants from the country into the city, in all ages, outstrip the natives, and become their masters. The reason is obvious: country education and country life are practical, and invigorating to body and mind, and hence those who are thus qualified triumph in the race of life. It has always been, it will always be so; the rustic Goths and Vandals will march in and conquer Rome, in the future, as they have done in the past. I say this, by no means insisting that my own life furnishes any very striking proof of the truth of my remarks; still, I may say that but for the country training and experience I have alluded to, and which served as a foothold for subsequent progress, I should have lingered in my career far behind the humble advances I have actually made.

"Let me illustrate and verify my meaning by specific examples. In my youth I became familiar with every bird common to the country: I knew his call, his song, his hue, his food, his habits; in short, his natural history. I could detect him by his flight, as far as the eye could reach. I knew all the quadrupeds—wild as well as tame. I was acquainted with almost every tree, shrub, bush, and flower, indigenous to the country; not botanically, but according to popular ideas. I recognized them instantly, wherever I saw them; I knew their forms, hues, leaves, blossoms, and fruit. I could tell their characteristics, their uses, the legends and traditions that belonged to them. All this I learned by familiarity with these objects; meeting with them in all my walks and rambles, and taking note of them with the emphasis and vigor of early experience and observation. In after days, I have never had time to make natural history a systematic study; yet my knowledge as to these things has constantly accumulated, and that without special effort. When I have travelled in other countries, the birds, the animals, the vegetation, have interested me as well by their resemblances as their differences, when compared with our own.

In looking over the pages of scientific works on natural history, I have always read with eagerness and intelligence of preparation; indeed, of vivid and pleasing associations. Every idea I had touching these matters was living and sympathetic, and beckoned other ideas to it, and these again originated still others. Thus it is that in the race of a busy life, by means of a homely, hearty start at the beginning, I have, as to these subjects, easily and naturally supplied, in some humble degree, the defects of my irregular education, and that too, not by a process of repulsive toil, but with a relish superior to all the seductions of romance. I am therefore a believer in the benefits accruing from simple country life and simple country habits, as here illustrated, and am, therefore, on all occasions anxious to recommend them to my friends and countrymen. To city people, I would say, educate your children, at least partially, in the country, so as to imbue them with the love of nature, and that knowledge and training which spring from simple rustic sports, exercises, and employments. To country people, I would remark, be not envious of the city, for in the general balance of good and evil, you have your full portion of the first, with a diminished share of the last."

THE HOMESPUN ERA OF COMMON SCHOOLS.

BY HORACE BUSHNELL, D.D.

"But the schools—we must not pass by these, if we are to form a truthful and sufficient picture of the homespun days. The schoolmaster did not exactly go round the district to fit out the children's minds with learning, as the shoemaker often did to fit their feet with shoes, or the tailor to measure and cut for their bodies; but, to come as near it as possible, he boarded round, (a custom not yet gone by,) and the wood for the common fire was supplied in a way equally primitive, viz., by a contribution of loads from the several families, according to their several quantities of childhood. The children were all clothed alike in homespun; and the only signs of aristocracy were, that some were clean and some a degree less so, some in fine white and striped linen, some in brown tow crash; and, in particular, as I remember, with a certain feeling of quality I do not like to express, the good fathers of some testified the opinion they had of their children, by bringing fine round loads of hickory wood to warm them, while some others, I regret to say,

brought only scanty, scraggy, ill-looking heaps of green oak, white birch, and hemlock. Indeed, about all the bickerings of quality among the children, centered in the quality of the wood pile. There was no complaint, in those days, of the want of ventilation; for the large open fire-place held a considerable fraction of a cord of wood, and the windows took in just enough air to supply the combustion. Besides, the bigger lads were occasionally ventilated, by being sent out to cut wood enough to keep the fire in action. The seats were made of the outer slabs from the saw-mill, supported by slant legs driven into and a proper distance through auger holes, and planed smooth on the top by the rather tardy process of friction. But the spelling went on bravely, and we ciphered away again and again, always till we got through Loss and Gain. The more advanced of us, too, made light work of Lindley Murray, and went on to the parsing, finally, of extracts from Shakspeare and Milton, till some of us began to think we had mastered their tough sentences in a more consequential sense of the term than was exactly true. O, I remember (about the remotest thing I can remember) that low seat, too high, nevertheless, to allow the feet to touch the floor, and that friendly teacher who had the address to start a first feeling of enthusiasm and awaken the first sense of power. He is living still, and whenever I think of him, he rises up to me in the far background of memory, as bright as if he had worn the seven stars in his hair. (I said he is living; yes, he is here to-day, God bless him!) How many others of you that are here assembled, recall these little primitive universities of homespun, where your mind was born, with a similar feeling of reverence and homely satisfaction. Perhaps you remember, too, with a pleasure not less genuine, that you received the classic discipline of the university proper, under a dress of homespun, to be graduated, at the close, in the joint honors of broadcloth and the parchment."

We might add other lights and shades to the picture of school life as it was down to a very recent period in New England and New York, but we must refer our readers to that amusing and instructive volume of Rev. Warren Burton, "The District School as it was." We must pass to the elementary schools of Pennsylvania and the Southern States.

LETTER FROM WILLIAM DARLINGTON, M.D.,
LL.D.

"At your request, I propose to attempt a brief and hasty sketch of my acquaintance with, and reminiscences of the *Country Schools*, and their condition, some sixty-five or seventy years since, in the south-eastern corner of the state of Pennsylvania; more particularly the school at Birmingham, Chester county, where the limited instruction of my youthful days was chiefly acquired.

"My earliest recollections of the school to which I was sent go back to that trying period of loose government, rusticity, and scarcity experienced in the interval between the War of Independence and the adoption of the Federal Constitution; and if it were given me to wield the pen of *Tom Brown of Rugby*, I might peradventure furnish some graphic details of our rural seminaries of learning in those days of general destitution. But, under present circumstances, I can only offer the imperfect narrative of incidents and observations, as retained in an almost octogenarian memory.

"At the time when I was first sent to school—say in 1787–8—school-houses were rare; and there was little or no organization for their maintenance. The country round, having been recently ravaged by a hostile army, was scantily supplied with teachers, who occasionally obtained schools by going among the principal families of the vicinage, and procuring subscribers for a quarter's tuition of the children on hand. Those who were too young to be serviceable on the farm were allowed to go to school in the summer season; but the larger ones (*expertus loquor*) could only be spared for that purpose during winter. The extent of rural instruction was then considered to be properly limited to what a worthy London alderman designated as the *three R's*, viz., 'Reading, Riting, and Rithmetic.' To cipher beyond the *Rule of Three* was deemed a notable achievement and mere surplusage among the average of country scholars. The business of teaching, at that day, was disdainfully regarded as among the humblest and most unprofitable of callings; and the *teachers*—often low-bred, intemperate adventurers from the old world—were generally about on a *par* with the prevalent estimate of the profession. Whenever a thriftless vagabond was found to be good for nothing else, he would resort to *school-keep-*

ing, and teaching young American ideas how to shoot! It was my good fortune, however, to have a teacher who was a distinguished exception to the sorry rule referred to. JOHN FORSYTHE was a native of the Emerald Isle, born in 1754, received a good English education at home, and while yet a young man, migrated to the county of *Chester*, in the land of PENN, where he became an excellent schoolmaster. When he arrived in our quakerly settlement, he was a gay young Presbyterian, dressed in the fashionable apparel of the world's people; and being withal musical in his taste, was an expert performer on the violin. He soon, however, adopted the views and principles of the 'Friends,' among whom he remained, married one of the society, and was ever recognized as an exemplary and valuable member.

"As the head and master-spirit of the school, at Birmingham meeting-house, established under the auspices of the Quaker society, he taught for a number of years, and always applied himself *con amore* to his arduous duties. He accomplished more in exciting a taste for knowledge and developing young intellects, than any teacher who had theretofore labored in that hopeful vineyard. He effectually routed the lingering old superstitions, prejudices, and benighted notions of preceding generations, and ever took delight in introducing youthful genius to the bright fields of literature and science. The young men of his day, who have since figured in the world, were deeply indebted to John Forsythe for the aid which he afforded them in their studies, as well as for the sound doctrines which he inculcated; and some few of them yet survive to make the grateful acknowledgment.

"When the noble Quaker institution at *West-town* was erected, near the close of the last century, the skill and experience of John Forsythe were put in requisition, until it was fairly inaugurated; after which he retired to his comfortable farm, in East Bradford, where he passed a venerable old age, until his 87th year, in superintending agricultural employments and in manifesting a lively interest in the progress of education among our people. No instructor has labored in this community more faithfully, nor with better effect. None has left a memory more worthy to be kindly cherished.

"The old *school-house* at Birmingham was a one story stone building, erected by men who did not understand the subject; and

was badly lighted and ventilated. The *discipline* of that day (adopted from the mother country) was pretty severe. The real *birch* of the botanists not being indigenous in the immediate vicinity of the school, an efficient substitute was found in young apple tree sprouts, as unruly boys were abundantly able to testify.

"The *school books* of my earliest recollection were a cheap English spelling book, the Bible for the reading classes, and when we got to ciphering, the 'Schoolmasters' Assistant.' The 'Spelling Book' and 'Assistant' were by Thomas Dilworth, an English schoolmaster at Wapping. The 'Assistant' was a useful work, but has long since disappeared. The 'counterfeit presentment' of the worthy author faced the title-page, and was familiarly known to every schoolboy of my time. The Spelling Book contained a little elementary grammar, in which the English substantives were declined through all the cases (genitive, dative, etc.) of the Latin. But *grammar* was then an unknown study among us. Dilworth's 'Spelling Book,' however, was soon superseded by a greatly improved one, compiled by John Pierce, a respectable teacher of Delaware county, Pennsylvania. This comprised a tolerable English grammar, for that period, and John Forsythe introduced the study into his school with much zeal and earnestness. Intelligent employers were made to comprehend its advantages, and were pleased with the prospect of a hopeful advance in that direction; but dull boys and illiterate parents could not appreciate the benefit. Great boobies often got permission, at home, to evade the study, but they could not get round John Forsythe in that way. They would come into school with this promised indulgence, and loudly announce, 'Daddy says I needn't *larn grammar*; it's no use;' when the energetic response from the desk was, 'I don't care what daddy says. He knows nothing about it; and I say thou shalt learn it!' and so some general notion of the subject was impressed upon the minds even of the stupid; while many of the brighter youths became excellent grammarians.

"In this *Friendly* seminary we were all required to use the *plain language* in conversation, being assured that it was wrong, both morally and grammatically, to say *you* to one person. Our teacher contrived a method of his own for mending our cacology, even while at our noonday sports. He pre-

pared a small piece of board or shingle, which he termed a *paddle*; and whenever a boy was heard uttering bad grammar, he had to take the paddle, step aside, and refrain from play, until he detected some other unlucky urchin trespassing upon syntax; when he was authorized to transfer the badge of interdiction to the last offender, and resume his amusements. It was really curious to observe how critical we soon became, and how much improvement was effected by this whimsical and simple device.

"Pierce's 'Spelling Book' kept its position in our school for several years, but was at length superseded, in the grammatical department, by a useful little volume, prepared by John Comly, of Bucks county, Pennsylvania. *Lindley Murray* and others prepared elaborate grammars, which were successively introduced, as our schools improved or created a demand; and so rapidly have the bookmaking competitors in that department multiplied that their name is now legion, and the respective value of their works is known only to experts in the art of teaching.

"Excellent works in *Reading and Elocution* are now so abundant and well known in all our respectable seminaries, that they need not to be here enumerated. One of the best and most popular of those works, some half century or more since, was a volume entitled 'The Art of Speaking,' compiled, I think, by a Mr. Rice, in England.

"But, as we have now reached the age of academies, normal institutes, and schools for the people, I presume you will gladly forego a further extension of this prosy narrative, so little calculated to interest a veteran in the great cause of education. I have ever been a sincere friend and advocate of the blessing; but, unfortunately, my acquaintance with it has been mainly limited to a humbling consciousness of my deficiencies in the ennobling attainment.

"Very respectfully,

"WM. DARLINGTON.

"WEST CHESTER, PA., Dec. 21, 1860."

SCHOOLS IN PHILADELPHIA.

The following picture of the internal economy of one of the best schools of Philadelphia, is taken from Watson's "Annals of Philadelphia and Pennsylvania."

"My facetious friend, Lang Syne, has presented a lively picture of the 'schoolmas-

ters' in those days, when 'preceptors,' and 'principals,' and 'professors' were yet unnamed. What is now known as 'Friends' Academy,' in Fourth street, was at that time occupied by four different masters. The best room down-stairs by Robert Proud, Latin master; the one above him, by William Waring, teacher of astronomy and mathematics; the east room, up-stairs, by Jeremiah Paul, and the one below, 'last not least' in our remembrance, by J. Todd, and severe he was. The State House clock, being at the time visible from the school pavement, gave to the eye full notice when to break off marble and plug top, hastily collect the 'stakes,' and bundle in, pell-mell, to the school-room, where, until the arrival of the 'master of scholars,' John Todd, they were busily employed, every one in finding his place, under the control for the time of a short Irishman, usher, named Jimmy McCue. On the entrance of the master, all shuffling of the feet, 'scrouging,' hitting of elbows, and whispering disputes, were hastily adjusted, leaving a silence which might be felt, 'not a mouse stirring.' He, Todd, dressed after the plainest manner of Friends, but of the richest material, with looped cocked hat, was at all times remarkably clean and nice in his person, a man of about sixty years, square built, and well sustained by bone and muscle.

"After an hour, maybe, of quiet time, every thing going smoothly on—no sound, but from the master's voice, while hearing the one standing near him, a dead calm, when suddenly a brisk slap on the ear or face, for something or for nothing, gave 'dreadful note' that an eruption of the lava was now about to take place. Next thing to be seen was 'strap in full play over the head and shoulders of Pilgarlic.' The passion of the master 'growing by what it fed on,' and wanting elbow room, the chair would be quickly thrust on one side, when, with sudden gripe, he was to be seen dragging his struggling suppliant to the flogging ground, in the centre of the room; having placed his left foot upon the end of a bench, he then, with a patent jerk, peculiar to himself, would have the boy completely horsed across his knee, with his left elbow on the back of his neck, to keep him securely on. In the hurry of the moment he would bring his long pen with him, griped between his strong teeth (visible the

while), causing both ends to descend to a parallel with his chin, and adding much to the terror of the scene. His face would assume a deep claret color—his little bob of hair would disengage itself, and stand out, each 'particular hair' as it were, 'up in arms and eager for the fray.' Having his victim thus completely at command, and all useless drapery drawn up to a bunch above the waistband, and the rotundity and the nankeen in the closest affinity possible for them to be, then once more to the 'staring crew' would be exhibited the dexterity of master and strap. By long practice he had arrived at such perfection in the exercise, that, moving in quick time, the fifteen inches of bridle rein (*alias* strap) would be seen after every cut, elevated to a perpendicular above his head; from whence it descended like a flail on the stretched nankeen, leaving 'on the place beneath' a fiery red streak, at every slash. It was customary with him to address the sufferer at intervals, as follows: 'Does it hurt?' 'Oh! yes, master; oh! don't, master.' 'Then I'll make it hurt thee more. I'll make thy flesh creep—thou shan't want a warming pan to-night. Intolerable being! Nothing in nature is able to prevail upon thee but my strap.' He had one boy named George Fudge, who usually wore leather breeches, with which he put strap and its master at defiance. He would never acknowledge pain—he would not 'sing out.' Todd seized him one day, and having gone through the evolutions of strapping (as useless, in effect, as if he had been thrashing a flour-bag), almost breathless with rage, he once more appealed to the feelings of the 'reprobate,' by saying: 'Does it not hurt?' The astonishment of the school and the master was completed, on hearing him sing out, 'No! Hurray for leather crackers!' He was thrown off immediately, sprawling on the floor, with the benediction as follows: 'Intolerable being! Get out of my school. Nothing in nature is able to prevail upon thee—not even my strap!'

"'Twas not 'his love of learning was in fault,' so much as the old British system of introducing learning and discipline into the brains of boys and soldiers by dint of punishment. The system of flogging on all occasions in schools, for something or for nothing, being protected by law, gives free play to the passions of the master, which he, for one, exercised with great severity.

The writer has, at this moment, in his memory, a schoolmaster *then* of this city, who, a few years ago, went deliberately out of his school to purchase a cow-skin, with which, on his return, he extinguished his bitter revenge on a boy who had offended him. The age of chivalry preferred ignorance in its sons, to having them subjected to the fear of a pedagogue—believing that a boy who had quailed under the eye of the schoolmaster, would never face the enemy with boldness on the field of battle; which it must be allowed is ‘a swing of the pendulum’ too far the other way. A good writer says: ‘We do not *harden* the wax to receive the impression—wherefore, the teacher seems himself most in need of *correction*—for he, unfit to teach, is making them unfit to be taught!’

“I have been told by an aged gentleman, that in the days of his boyhood, sixty-five years ago, when boys and girls were together, it was a common practice to make the boys strip off their jackets, and loose their trowsers’ band, preparatory to hoisting them upon a boy’s back so as to get his whipping, with only the linen between the flesh and the strap. The girls too—we pity them—were obliged to take off their stays to receive their floggings with equal sensibility. He named one distinguished lady, *since*, who was so treated among others, in his school. All the teachers then were from England and Ireland, and brought with them the rigorous principles which had before been whipped into themselves at home.”

Robert Coram, in a pamphlet devoted in part to a “Plan for the General Establishment of Schools throughout the United States,” printed in Wilmington, Delaware, in 1791, characterizes the state of education as follows: “The country schools, through most of the United States, whether we consider the buildings, the teachers, or the regulations, are in every respect completely despicable, wretched, and contemptible. The buildings are in general sorry hovels, neither wind-tight nor water-tight; a few stools serving in the double capacity of bench and desk, and the old leaves of copy books making a miserable substitute for glass windows. The teachers are generally foreigners, shamefully deficient in every qualification necessary to convey instruction to youth, and not seldom addicted to gross

vices. Absolute in his own opinion, and proud of introducing what he calls his European method, one calls the first letter of the alphabet, *aw*. The school is modified upon this plan, and the children who are advanced are beat and cuffed to forget the former mode they have been taught, which irritates their minds and retards their progress. The quarter being finished, the children lie idle until another master offers, few remaining in one place more than a quarter. When the next schoolmaster is introduced, he calls the first letter *a*, as in *mat*; the school undergoes another reform, and is equally vexed and retarded. At his removal a third is introduced, who calls the first letter *hay*. All these blockheads are equally absolute in their own notions, and will by no means suffer the children to pronounce the letter as they were first taught; but every three months the school goes through a reform—error succeeds error, and dunce the second reigns like dunce the first. I will venture to pronounce, that however seaport towns, from local circumstances, may have good schools, the country schools will remain in their present state of despicable wretchedness, unless incorporated with government. * * * The necessity of a reformation in the country schools is too obvious to be insisted on; and the first step to such a reformation will be by turning private schools into public ones. The schools should be public, for several reasons—1st. Because, as has been before said, every citizen has an equal right to subsistence, and ought to have an equal opportunity of acquiring knowledge. 2d. Because public schools are easiest maintained, as the burthen falls upon all the citizens. The man who is too squeamish or lazy to get married, contributes to the support of public schools, as well as the man who is burthened with a large family. But private schools are supported only by heads of families, and by those only while they are interested; for as soon as the children are grown up, their support is withdrawn; which makes the employment so precarious, that men of ability and merit will not submit to the trifling salaries allowed in most country schools, and which, by their partial support, cannot afford a better.”

SCHOOL HOLIDAY IN GEORGIA.

We have not been very successful in gathering the printed testimony of the dead, or

the vivid reminiscences of the living, respecting the internal economy of schools, public or family, in any of the Southern states prior to 1800. The following graphic sketch of "the turn out" of the schoolmaster, from Judge Longstreet's "Georgia Scenes," is said to be "literally true:—"

"In the good old days of *fescues*, *abisselfas* and *anpersants*,* terms which used to be familiar in this country during the Revolutionary war, and which lingered in some of our country schools for a few years afterward, I visited my friend Captain Griffen, who resided about seven miles to the eastward of Wrightsborough, then in Richmond, but now in Columbia county. I reached the captain's hospitable home on Easter, and was received by him and his good lady with a *Georgia welcome* of 1790.

"The day was consumed in the interchange of news between the captain and myself (though, I confess, it might have been better employed), and the night found us seated round a temporary fire, which the captain's sons had kindled up for the purpose of dyeing eggs. It was a common custom of those days with boys to dye and peck eggs on Easter Sunday, and for a few days afterward. They were colored according to the fancy of the dyer; some yellow, some green, some purple, and some with a variety of colors, borrowed from a piece of calico. They were not unfrequently beautified with a taste and skill which would have extorted a compliment from Hezekiah Niles, if he had seen them a year ago, in the hands of the '*young operatives*,' in some of the northern manufactories. No sooner was the work of dyeing finished, than our '*young operatives*' sallied forth to stake the whole proceeds of their '*domestic industry*' upon a peck. Egg was struck against egg, point to point, and the egg that was broken was

given up as lost to the owner of the one which came whole from the shock.

"While the boys were busily employed in the manner just mentioned, the captain's youngest son, George, gave us an anecdote highly descriptive of the Yankee and Georgia character, even in their buddings, and at this early date. 'What you think, pa,' said he, 'Zeph Pettibone went and got his uncle Zach to turn him a wooden egg; and he won a whole hatful o' eggs from all us boys 'fore we found it out; but, when we found it out, maybe John Brown didn't smoke him for it, and took away all his eggs, and give 'em back to us boys; and you think he didn't go then and git a guinea egg, and win most as many more, and John Brown would o' give it to him agin if all we boys hadn't said we thought it was fair. I never see such a boy as that Zeph Pettibone in all my life. He don't mind whipping no more 'an nothing at all, if he can win eggs.'

"This anecdote, however, only fell in by accident, for there was an all-absorbing subject which occupied the minds of the boys during the whole evening, of which I could occasionally catch distant hints, in under tones and whispers, but of which I could make nothing, until they were afterward explained by the captain himself. Such as 'I'll be bound Pete Jones and Bill Smith stretches him.' 'By Jockey, soon as they seize him, you'll see me down upon him like a duck upon a June-bug.' 'By the time he touches the ground, he'll think he's got into a hornet's nest,' etc.

"The boys," said the captain, as they retired, 'are going to turn out the schoolmaster to-morrow, and you can perceive they think of nothing else. We must go over to the schoolhouse and witness the contest, in order to prevent injury to preceptor or pupils; for, though the master is always, upon such occasions, glad to be turned out, and only struggles long enough to present his patrons a fair apology for giving the children a holiday, which he desires as much as they do, the boys always conceive a holiday gained by a 'turn out' as the sole achievement of their valor; and in their zeal to distinguish themselves upon such memorable occasions, they sometimes become too rough, provoke the master to wrath, and a very serious conflict ensues. To prevent these consequences, to bear witness that the master was *forced* to yield before he would withhold a day of his promised labor from his

* The *fescue* was a sharpened wire or other instrument used by the preceptor to point out the letters to the children.

Abisselfa is a contraction of the words "a by itself, a." It was usual, when either of the vowels constituted a syllable of a word, to pronounce it, and denote its independent character by the words just mentioned, thus: "a by itself, a, c-o-r-n corn, acorn;" "e by itself, e, v-i-l, evil," etc.

The character which stands for the word "and" (&) was probably pronounced with the same accompaniment, but in terms borrowed from the Latin language, thus: "& *per se*" (by itself) *and*. Hence, "*anpersant*."

employers, and to act as a mediator between him and the boys in settling the articles of peace, I always attend; and you must accompany me to-morrow.' I cheerfully promised to do so.

"The captain and I rose before the sun, but the boys had risen and were off to the school-house before the dawn. After an early breakfast, hurried by Mrs. G. for our accommodation, my host and myself took up our line of march toward the school-house. We reached it about half an hour before the master arrived, but not before the boys had completed its fortifications. It was a simple log pen, about twenty feet square, with a floorway cut out of the logs, to which was fitted a rude door, made of clapboards, and swung on wooden hinges. The roof was covered with clapboards also, and retained in their places by heavy logs placed on them. The chimney was built of logs, diminishing in size from the ground to the top, and over-spread inside and out with red clay mortar. The classic hut occupied a lovely spot, overshadowed by majestic hickories, towering poplars, and strong-armed oaks. The little plain on which it stood was terminated, at the distance of about fifty paces from its door, by the brow of a hill, which descended rather abruptly to a noble spring that gushed joyously forth among the roots of a stately beech at its foot.

"The boys had strongly fortified the school-house, of which they had taken possession. The door was barricaded with logs, which I should have supposed would have defied the combined powers of the whole school. The chimney, too, was nearly filled with logs of goodly size; and these were the only pass-ways to the interior. I concluded, if a *turn out* was all that was necessary to decide the contest in favor of the boys, they had already gained the victory. They had, however, not as much confidence in their out-works as I had, and therefore had armed themselves with long sticks, not for the purpose of using them upon the master if the battle should come to close quarters, for this was considered unlawful warfare, but for the purpose of guarding their *works* from his approaches, which it was considered perfectly lawful to protect by all manner of jabs and punches through the cracks. From the early assembling of the girls, it was very obvious that they had been let into the conspiracy, though they took no part in the active operations. They would, however,

occasionally drop a word of encouragement to the boys, such as 'I wouldn't turn out the master; but if I did turn him out, I'd die before I'd give up.'

"At length Mr. Michael St. John, the schoolmaster made his appearance. Though some of the girls had met him a quarter of a mile from the school-house, and told him all that had happened, he gave signs of sudden astonishment and indignation when he advanced to the door, and was assailed by a whole platoon of sticks from the cracks: 'Why, what does all this mean?' said he, as he approached the captain and myself, with a countenance of two or three varying expressions.

"'Why,' said the captain, 'the boys have turned you out, because you have refused to give them an Easter holiday.'

"'Oh,' returned Michael, 'that's it, is it? Well, I'll see whether their parents are to pay me for letting their children play when they please.' So saying, he advanced to the school-house, and demanded, in a lofty tone, of its inmates, an unconditional surrender.

"'Well, give us a holiday, then,' said twenty little urchins within, 'and we'll let you in.'

"'Open the door of the *academy*!—(Michael would allow nobody to call it a school-house)—'Open the door of the academy this instant,' said Michael, 'or I'll break it down.'

"'Break it down,' said Pete Jones and Bill Smith, 'and we'll break you down.'

"During this colloquy I took a peep into the fortress, to see how the garrison were affected by the parley. The little ones were obviously panic-struck at the first words of command; but their fears were all chased away by the bold determined reply of Pete Jones and Bill Smith, and they raised a whoop of defiance.

"Michael now walked round the academy three times, examining all its weak points with great care. He then paused, reflected for a moment, and wheeled off suddenly toward the woods, as though a bright thought had just struck him. He passed twenty things which I supposed he might be in quest of, such as huge stones, fence rails, portable logs, and the like, without bestowing the least attention upon them. He went to one old log, searched it thoroughly, then to another, then to a hollow stump, peeped into it with great care, then to a

hollow log, into which he looked with equal caution, and so on.

"What is he after?" inquired L.

"I'm sure I don't know," said the captain, "but the boys do. Don't you notice the breathless silence which prevails in the school-house, and the intense anxiety with which they are eyeing him through the cracks?"

"At this moment Michael had reached a little excavation at the root of a dogwood, and was in the act of putting his hand into it, when a voice from the garrison exclaimed, with most touching pathos, 'Lo'd o' messy, he's found my eggs! boys, let's give up.'"

"I won't give up," was the reply from many voices at once.

"Rot your cowardly skin, Zeph Pettibone, you wouldn't give a wooden egg for all the holydays in the world."

"If these replies did not reconcile Zephaniah to his apprehended loss, it at least silenced his complaints. In the mean time Michael was employed in relieving Zeph's storehouse of its provisions; and, truly, its contents told well for Zeph's skill in egg-pecking. However, Michael took out the eggs with great care, and brought them within a few paces of the schoolhouse, and laid them down with equal care in full view of the besieged. He revisited the places which he had searched, and to which he seemed to have been led by intuition; for from nearly all of them did he draw eggs, in greater or less numbers. These he treated as he had done Zeph's, keeping each pile separate. Having arranged the eggs in double files before the door, he marched between them with an air of triumph, and once more demanded a surrender, under pain of an entire destruction of the garrison's provisions.

"Break 'em just as quick as you please," said George Griffin; "our mothers 'll give us a plenty more, won't they, pa?"

"I can answer for yours, my son," said the captain; "she would rather give up every egg upon the farm than to see you play the coward or traitor to save your property."

"Michael, finding that he could make no impression upon the fears or the avarice of the boys, determined to carry their fortifications by storm. Accordingly he procured a heavy fence-rail, and commenced the assault upon the door. It soon came to pieces, and the upper logs fell out, leaving a space of about

three feet at the top. Michael boldly entered the breach, when, by the articles of war, sticks were thrown aside as no longer lawful weapons. He was resolutely met on the half-demolished rampart by Peter Jones and William Smith, supported by James Griffin. These were the three largest boys in the school; the first about sixteen years of age, the second about fifteen, and the third just eleven. Twice was Michael repulsed by these young champions; but the third effort carried him fairly into the fortress. Hostilities now ceased for a while, and the captain and I, having levelled the remaining logs at the door, followed Michael into the house. A large three inch plank (if it deserve that name, for it was wrought from the half of a tree's trunk entirely with the axe), attached to the logs by means of wooden pins, served the whole school for a writing desk. At a convenient distance below it, and on a line with it, stretched a smooth log, resting upon the logs of the house, which answered for the writers' seat. Michael took his seat upon the desk, placed his feet on the seat, and was sitting very composedly, when with a simultaneous movement, Pete and Bill seized each a leg, and marched off with it in quick time. The consequence is obvious; Michael's head first took the desk, then the seat, and finally the ground (for the house was not floored), with three sonorous thumps of most doleful portent. No sooner did he touch the ground than he was completely buried with boys. The three elder laid themselves across his head, neck and breast, the rest arranging themselves *ad tibi'um*. Michael's equanimity was considerably disturbed by the first thump, became restive with the second, and took flight with the third. His first effort was to disengage his legs, for without them he could not rise, and to lie in his present position was extremely inconvenient and undignified. Accordingly he drew up his right, and kicked at random. This movement laid out about six in various directions upon the floor. Two rose crying: "Ding his old red-headed skin," said one of them, "to go and kick me right in my sore belly, where I fell down and raked it, running after that fellow that cried "school butter." *

* "I have never been able to satisfy myself clearly as to the literal meaning of these terms. They were

" 'Drot his old snaggle-tooth picture,' said he other, 'to go and hurt my sore toe, where I knocked the nail off going to the spring to fetch a gourd of *warter* for him, and not for myself n'other.'

" 'Hut!' said Captain Griffin, 'young Washingtons mind these trifles! At him again.'

"The name of Washington cured their wounds and dried up their tears in an instant, and they legged him *de novo*. The left leg treated six more as unceremoniously as the right had those just mentioned; but the talismanic name had just fallen upon their ears before the kick, so they were invulnerable. They therefore returned to the attack without loss of time. The struggle seemed to wax hotter and hotter for some time after Michael came to the ground, and he threw the children about in all directions and postures, giving some of them thrusts which would have placed the *ruffle-shirted* little darlings of the present day under the discipline of paregoric and opodeldoe for a week; but these hardy sons of the south seemed not to feel them. As Michael's head grew easy, his limbs, by a natural sympathy, became more quiet, and he offered one day's holiday as the price. The boys demanded a week; but here the captain interposed, and after the common but often unjust custom of arbitrators, split the difference. In this instance the terms were equitable enough, and were immediately acceded to by both parties. Michael rose in a good humor, and the boys were of course. Loud was their talking of their deeds of valor as they retired. One little fellow about seven years old, and about three feet and a half high, jumped up, cracked his feet together, and exclaimed, 'By jingo, Pete Jones, Bill Smith and *me* can hold any *Sinjin* [St. John] that ever trod Georgy-grit.'"

considered an unpardonable insult to a country school, and always justified an attack by the whole fraternity upon the person who used them in their hearing. I have known the scholars pursue a traveller two miles to be revenged of the insult. Probably they are a corruption of 'The school's better.' 'Better' was the term commonly used of old to denote a *superior*, as it sometimes is in our day: 'Wait till your betters are served,' for example. I conjecture, therefore, the expression just alluded to was one of challenge, contempt, and defiance, by which the person who used it avowed himself the *superior* in all respects of the whole school, from the preceptor down. If any one can give a better account of it, I shall be pleased to receive it."

AN OLD FIELD SCHOOL, OR ACADEMY, IN VIRGINIA.

THE experience of one of that class of teachers, who found temporary occupation in teaching the children of one or more families of planters in Virginia and other southern states, will be found in the "Travels of Four Years and a Half in the United States (in 1798, 1799, 1800, 1801 and 1802), by John Davis." Mr. Davis was an Englishman of more than ordinary education and of social address, and while in this country numbered among his friends such men as Aaron Burr, President Jefferson, and other men of high political standing. He was a private tutor in New York, South Carolina and Virginia, and his graphic sketches of men and manners show some of the deficiencies in the means of education which even wealthy planters in the southern states experienced. With letters of introduction from President Jefferson he proceeds to the plantation of a Mr. Ball, and is engaged to teach his and his neighbors' children:

"The following day every farmer came from the neighborhood to the house, who had any children to send to my Academy, for such they did me the honor to term the log-hut in which I was to teach. Each man brought his son, or his daughter, and rejoiced that the day was arrived when their little ones could light their tapers at the torch of knowledge! I was confounded at the encomiums they heaped upon a man whom they had never seen before, and was at a loss what construction to put upon their speech. No price was too great for the services I was to render their children; and they all expressed an eagerness to exchange perishable coin for lasting knowledge. If I would continue with them seven years! only seven years! they would erect for me a brick seminary on a hill not far off; but for the present I was to occupy a log-house, which, however homely, would soon vie with the sublime college of William and Mary, and consign to oblivion the renowned academy in the vicinity of Fauquier Court-House. I thought Englishmen sanguine; but these Virginians were infatuated.

"I now opened what some called an academy,* and others an Old Field School;

* "It is worth the while to describe the academy I occupied on Mr. Ball's plantation. It had one room and a half. It stood on blocks about two feet

and, however it may be thought that content was never felt within the walls of a seminary, I, for my part, experienced an exemption from care, and was not such a fool as to measure the happiness of my condition by what others thought of it.

"It was pleasurable to behold my pupils enter the school over which I presided; for they were not composed only of truant boys, but some of the fairest damsels in the country. Two sisters generally rode on one horse to the school-door, and I was not so great a pedagogue as to refuse them my assistance to dismount from their steeds. A running-footman of the negro tribe, who followed with their food in a basket, took care of the beast; and after being saluted by the young ladies with the courtesies of the morning, I proceeded to instruct them, with gentle exhortations to diligence of study.

"Common books were only designed for common minds. The unconnected lessons of Scot, the tasteless selections of Bingham, the florid harangues of Noah Webster, and the somniferous compilation of Alexander, were either thrown aside, or suffered to gather dust on the shelf; while the charming essays of Goldsmith, and his not less delectable *Novel*, together with the impressive work of Defoe, and the mild productions of Addison, conspired to enchant the fancy, and kindle a love of reading. The thoughts of these writers became engrafted on the minds, and the combinations of their diction on the language of the pupils.

"Of the boys I cannot speak in very encomiastic terms; but they were perhaps like all other school-boys, that is, more disposed to play truant than enlighten their minds.

and a half above the ground, where there was free access to the hogs, the dogs, and the poultry. It had no ceiling, nor was the roof lathed or plastered, but covered with shingles. Hence, when it rained, like the nephew of old Elwes, I moved my bed (for I slept in my academy) to the most comfortable corner. It had one window, but no glass, nor shutter. In the night, to remedy this, the mulatto wench who waited on me, contrived very ingeniously to place a square board against the window with one hand, and fix the rail of a broken down fence against it with the other. In the morning, when I returned from breakfasting in the 'great big house,' (my scholars being collected,) I gave the rail a forcible kick with my foot, and down tumbled the board with an awful roar. 'Is not my window,' said I to Virginia, 'of a very curious construction?' 'Indeed, indeed, sir,' replied my fair disciple, 'I think it is a mighty noisy one.'

The most important knowledge to an American, after that of himself, is the geography of his country. I, therefore, put into the hands of my boys a proper book, and initiated them by an attentive reading of the discoveries of the Genoese; I was even so minute as to impress on their minds the man who first desecrated land on board the ship of Columbus. That man was Roderic Triana, and on my exercising the memory of a boy by asking him the name, he very gravely made answer, Roderic Random.

"Among my male students was a New Jersey gentleman of thirty, whose object was to be initiated in the language of Cicero and Virgil. He had before studied the Latin grammar at an academy school (I use his own words) in his native state; but the academy school being burnt down, his grammar, alas! was lost in the conflagration, and he had neglected the pursuit of literature since the destruction of his book. When I asked him if he did not think it was some Goth who had set fire to his academy school, he made answer, 'So, it is like enough.'

"Mr. Dye did not study Latin to refine his taste, direct his judgment, or enlarge his imagination; but merely that he might be enabled to teach it when he opened school, which was his serious design. He had been bred a carpenter, but he panted for the honors of literature."

Mr. Davis accounts for his fidelity in teaching more hours than he was required to do by his contract, by his interest in the lessons of one of his female pupils:

"Hence I frequently protracted the studies of the children till one, or half past one o'clock; a practice that did not fail to call forth the exclamations both of the white and the black people. Upon my word, Mr. Ball would say, this gentleman is diligent; and Aunt Patty the negro cook would remark, 'He good cool-mossa that; he not like old Hodgkinson and old Harris, who let the boys out before twelve. He deserve good wages!'

"Having sent the young ladies to the family mansion, I told the boys to break up, and in a few minutes they who had even breathed with circumspection, now gave loose to the most riotous merriment, and betook themselves to the woods, followed by all the dogs on the plantation."

"There was a carpenter on the plantation, whom Mr. Ball had hired by the year.

He had tools of all kinds, and the recreation of Mr. Dye, after the labor of study, was to get under the shade of an oak, and make tables, or benches, or stools for the academy. So true is the assertion of Horace, that the cask will always retain the flavor of the liquor with which it is first impregnated.

“Well, Mr. Dye, what are you doing?”

“I am making a table for the academy school.”

“What wood is that?”

“It is white oak, sir.”

“What, then you are skilled in trees, you can tell oak from hickory, and ash from fir?”

“Like enough, sir. (A broad grin.) I ought to know those things; I served my time to it.”

“*Carpenter*.—I find, sir, Mr. Dye has done with his old trade; he is above employing his hands; he wants work for the brain. Well! larning is a fine thing; there’s nothing like larning. I have a son only five years old, that, with proper larning, I should not despair of seeing a member of Congress. He is a boy of genius; he could play on the Jews-harp from only seeing Sambo tune it once.”

“*Mr. Dye*.—I guess that’s Billy; he is a right clever child.”

“*Carpenter*.—How long, sir, will it take you to learn Mr. Dye Latin?”

“*Schoolmaster*.—How long, sir, would it take me to ride from Mr. Ball’s plantation to the plantation of Mr. Wormley Carter?”

“*Carpenter*.—Why that, sir, I suppose, would depend upon your horse.”

“*Schoolmaster*.—Well, then, sir, you solve your own interrogation. But here comes Dick. What has he got in his hand?”

“*Mr. Dye*.—A mole like enough. Who are you bringing that to, Dick?”

“*Dick*.—Not to you. You never gave me the taste of a dram since I first know’d you. Worse luck to me; you New Jersey men are close shavers; I believe you would skin a louse. This is a mole. I have brought it for the gentleman who came from beyond sea. He never refuses Dick a dram; I would walk through the wilderness of Kentucky to serve him. Lord! how quiet he keeps his school. It is not now as it was; the boys don’t go clack, clack, clack, like Squire Pendleton’s mill upon Catharpin Run!”

“*Schoolmaster*.—You have brought that mole, Dick, for me.”

“*Dick*.—Yes, master, but first let me tell you the history of it. This mole was once a man; see, master (Dick exhibits the mole), it has got hands and feet just like you and me. It was once a man, but so proud, so lofty, so puffed-up, that God, to punish his insolence, condemned him to crawl under the earth.”

“*Schoolmaster*.—A good fable, and not unhappily moralized. Did you ever hear or read of this before, Mr. Dye?”

“*Mr. Dye*.—Nay (a broad grin), I am right certain it does not belong to *Æsop*. I am certain sure Dick did not find it there.”

“*Dick*.—Find it where? I would not wrong a man of the value of a grain of corn. I came across the mole as I was hoeing the potato-patch. Master, shall I take it to the school-house? If you are fond of birds, I know now for a mocking-bird’s nest; I am only afeared those young rogues, the school-boys, will find out the tree. They play the mischief with every thing, they be full of devilment. I saw Jack Lockhart throw a stone at the old bird, as she was returning to feed her young; and if I had not coaxed him away to look at my young puppies, he would have found out the nest.”

“I had been three months invested in the first executive office of pedagogue, when a cunning old fox of a New Jersey planter (a Mr. Lee) discovered that his eldest boy wrote a better hand than I. Fame is swift-footed; *vires acquirit cundo*; the discovery spread far and wide; and whithersoever I went, I was an object for the hand of scorn to point his slow unmoving finger at, as a schoolmaster that could not write. Virginia gave me for the persecutions I underwent a world of sighs, her swelling heavens rose and fell with indignation at old Lee and his abettors. But the boys caught spirit from the discovery. I could perceive a mutiny breaking out among them; and had I not in time broke down a few branches from an apple tree before my door, it is probable they would have displayed their gratitude for my instructions by throwing me out of my school-window. But by arguing with one over the shoulders, and another over the back, I maintained with dignity the first executive office of pedagogue.

“I revenged myself amply on old Lee. It was the custom of his son (a lengthy fellow of about twenty) to come to the academy with a couple of huge mastiffs at his heels. Attached to their master (*par nobile*

fratrum) they entered without ceremony Pohoke Academy, bringing with them myriads of fleas, wood-lice, and ticks. Nay, they would often annoy Virginia, by throwing themselves at her feet, and inflaming the choler of a little lap-dog, which I had bought because of his diminutive size, and which Virginia delighted to nurse for me. I could perceive the eye of Virginia rebuke me for suffering the dogs to annoy her; and there lay more peril in her eye than in the jaws of all the mastiffs in Prince William County.

"Mr. Lee," said I, 'this is the third time I have told you not to convert the academy into a kennel, and bring your dogs to school.' Lee was mending his pen 'judgmatically.' He made no reply, but smiled.

"I knew old Dick the negro had a bitch, and that his bitch was proud. I walked down to Dick's log-house. Dick was beating flax.

"Dick," said I, 'old Farmer Lee has done me much evil—I don't like the old man myself, master, said Dick)—and his son, repugnant to my express commands, has brought his father's two plantation dogs to the academy. Revenge is sweet—'

"Right, master," said Dick. 'I never felt so happy as when I bit off Cuffey's great toe and swallowed it—'

"Do you, Dick," said I, 'walk past the school-house with your bitch. Lee's dogs will come out after her. Go round with them to your log-house; and when you have once secured them, hang both of them up by the neck.'

"Leave it to me, master," said Dick. 'I'll fix the business for you in a few minutes. I have a few fadoms of rope in my house—that will do it.'

"I returned to the academy. The dogs were stretched at their ease on the floor. 'Oh! I am glad you are come,' exclaimed Virginia; 'those great big dogs have quite scared me.'

"In a few minutes Dick passed the door with his slut. Quick from the floor rose Mr. Lee's two dogs, and followed the female. The rest may be supplied by the imagination of the reader. Dick hung up both the dogs to the branch of a pine-tree; old Lee lost the guards to his plantation; the negroes broke open his barn, pilfered his sacks of Indian corn, rode his horses in the night—and thus was I revenged on Alexander the coppersmith.

"Three months had now elapsed, and I

was commanded officially to resign my sovereign authority to Mr. Dye, who was in every respect better qualified to discharge its sacred functions. He understood tare and tret, wrote a copper-plate hand, and, balancing himself upon one leg, could flourish angels and corkscrews. I, therefore, gave up the 'academy school' to Mr. Dye, to the joy of the boys, but the sorrow of Virginia."

Whilst schools were thus poorly equipped and the instruction given was thus defective in its methods and meagre in its extent, it becomes of interest to inquire whence such a measure of general intelligence and so many individual cases of attaining to an eminent position in society. This was the result of no single cause alone, but of a variety in combination.

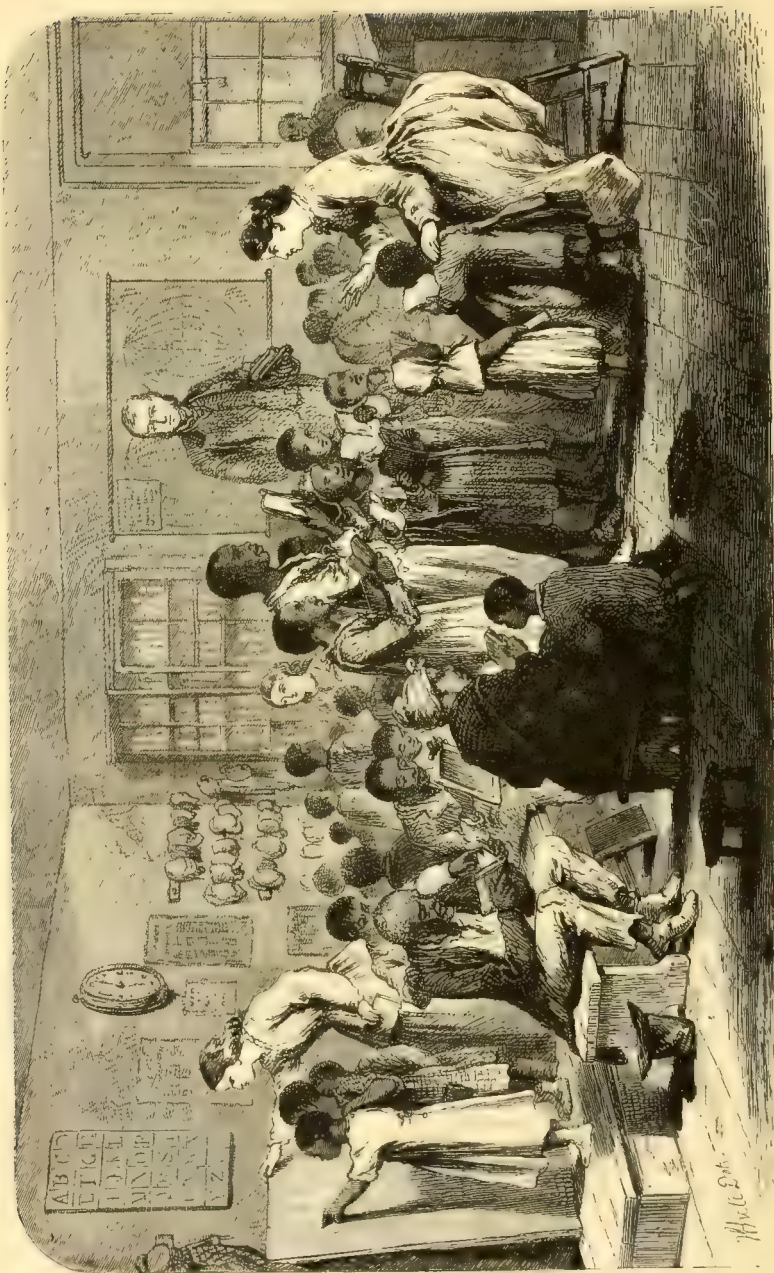
The first of these that may be named, both in its influence upon childhood and upon manhood, was the necessity of a hard fought battle for existence, but relieved by the assurance that victory would be the reward of persistent exertion. Its results were robustness, patience of toil, resoluteness and perseverance in encountering difficulties, and fertility of resources. The rustic lad,—and making the necessary variations, we include the female sex with the representative male,—the rustic lad who had been trained to help his parents from the moment he had acquired strength to steady his steps, to toil on all the same whether the bright sun cheered him or the chill air benumbed his limbs; whether his tasks were varied, pleasant and light, or, on the contrary, he had learned patience, marching beside the patient ox all the long hours of a long spring day, the animals only alternating with others which served as relays; and had been no stranger to such discipline as picking stones in the stubble whilst the sad heavens distilled a drizzly rain, they condensing all their gloom in his soul, but withheld those large and frequent drops which would have been the signal of his release; and among the least severe of whose lessons in acquiring hardihood had been, in gathering the fruits of autumn, to face its frosts without mittens or shoes; this lad found nothing in the difficulties of the school-room to appall him, and storms and deep drifts rather added zest to his daily walks. No unintelligible jargon of the spelling book, no abstruse section in his reader, was an overmatch for his industry.



INTERIOR VIEW OF A SCHOOL-HOUSE IN 1770.



INTERIOR VIEW OF A SCHOOL-HOUSE IN 1870.



CONTRABAND SCHOOLS.

True, he did not understand all he studied, but he learned to spell and to read and to commit to memory what was assigned him. And when he took his arithmetic, which contained only definitions, rules and examples, although his teacher vouchsafed him little explanation, he had perseverance enough to ponder every dark process till light broke through. And there were instances of boys who worked for consecutive hours and days at problems confessedly some of the most knotty that could be found, till at last their unaided exertions were rewarded with success, which brought more exquisite joy than ever thrilled the finder of a rare gem. These exceptional cases stimulated the more dull, and most became possessed of at least the rudiments of the science, quite sufficient for practical life, or which under the stimulus of necessity became subsequently enlarged to that extent. In manhood no blind adherence to traditional methods was or could be observed. Emergencies were constantly arising which taxed ingenuity to the utmost in devising the fitting expedients to meet them. It was a daily study to make the narrowest means serve the same ends as the amplest. Hard thought was expended without stint upon labor-saving processes, improvements and inventions. Thus was gained a discipline of mind beyond what the higher college mathematics usually imparts, and oftentimes a readiness in applying mechanical principles, of which many an engineer trained in the schools is utterly devoid, however prompt he may be in the routine to which he is accustomed.

The family training, aside from the inuring of children to patient industry, contributed greatly to their profiting from their school privileges. To do or not to do was not then left so generally to the child's pleasure. He was made to obey before he had experienced the delight of carrying into effect his own will in opposition to that of others; and thus was formed the habit of unquestioning compliance with the requirements of parents. When the child could understand the subject, he was taught that however irksome at times were the tasks imposed upon him, it was only in virtue of the allotment that man was to eat bread by the sweat of his brow, and that only by a cheerful performance of what was within his power could he make a return for the care he was continually receiving. Thus from a sense of religious and filial obligation the rigor of their early disci-

pline was the more easily sustained. Self-control and a certain measure of self-reliance were results of the discipline of infancy even; and in advancing childhood it was inculcated in the house and in the field, that each must depend upon himself for whatever he was to be and to possess in life. And knowledge, knowledge that was not the mere blind recipient of instruction, intelligent knowledge which perceived relations, and reasoning knowledge which could make the practical application as opportunity served, was set forth as the condition indispensable to render exertion successful. Hence it was a prized privilege to go to school, as well as a pleasant exchange for physical toil for a brief period, an exchange of work at home for another variety of work in the school-room, not of one manner of busy idleness and mischief for another. Also in many cases the home was itself a school, and either that knowledge was there gained which others acquired at school, or study was further pursued under the guidance of parent, or brother or sister, who by some happy gift of Providence had required little tuition. Often also, winter evenings or other hours, when the labor of one pair of hands might be spared, were passed in the social reading of instructive books.

The listening every seventh day to two discourses, wherein were discussed the deepest theories which can be proposed to man, may be named as an additional item in the answer to our inquiry. The clergymen of that day had received the best education that the country afforded, and were daily cultivating intimacy with the profoundest theologians. Thus they had ever thoughts which they had originated or had made their own to present. And these thoughts were inwardly digested by a goodly number of their hearers, and becoming a part of their being, they too

"reasoned high
Of Providence, foreknowledge, will and fate,
Fixed fate, free will, foreknowledge absolute;"

and if they "found no end," they were not "in wandering mazes lost," for, unlike the lost angels, they ruled their discussions by the infallible word of inspiration. It cannot be said that serious thought then bored, or that the sparkle of the unsubstantial poem chiefly drew, or that triviality was the characteristic of the multitude.

The study of one book, and that the Bible, simple enough in parts to meet the under-

standing of the little child, and of interest enough to absorb his attention, and in other parts of depths which no finite intellect can sound, and everywhere wise above the wisdom of men, and without any alloy of error, was one of the most efficacious means of raising the mass of the people in intelligence, and in educating a few, who made it their constant meditation, to a nicety of discrimination and a profundity of thought truly wonderful. Take as an example one silvery haired man whose memory is cherished with veneration. His school privileges had been less even than the scanty amount of most of his contemporaries, hardly amounting to three winter schools in all. Moreover, weakness of the eyes almost cut him off from reading books and papers throughout his life. But he was able to read daily a few verses, sometimes several chapters, in his large quarto Bible, and when he read aloud, all untaught as he was, he read with a naturalness and gave the sense, so that the hearer marvelled. Comparing scripture with scripture, he had attained to a skill in interpreting which seldom erred. His quickness in detecting a fallacy or in observing a doctrine which harmonized not with the living oracles was surpassed by very few of even the most highly educated of schoolmen. He was exceedingly retiring, but to the few who knew him, his life and his language seemed as correct as the words of that book on which both, with perfect naturalness, without any tinge of formality or quaintness, were modeled. Who will venture to say that this man's education was not incomparably superior to that of him who has delved a whole life in conflicting systems, who has sought to know the thoughts of all reported as great, but who has settled nothing for himself?

The political principles which found their expression in the declaration of independence, and which were a cherished inheritance from the fathers, leading to a general participation in the government of the country, and producing the habit of earnestly debating every question of public concern, had no small share of influence in exciting intensity and energy of mental action. By the fireside, in the field, at the corners of the streets, in the shops and stores, those powers were developed which had further exercise in the town meeting, and carried their possessor to some humble position of trust or authority; and when here trained and

shown to be capable of sustaining higher responsibilities, advanced him again, so that he who had forged iron chains, was chosen to fashion the more efficacious restraints of laws; he who had occupied the cobbler's seat, was promoted to the bench of justice; and he who had been wont to rule oxen was thought worthy to govern men.

The newspaper, and the family, and the village library contributed largely to the general intelligence. The weekly paper furnished no small part of the topics of conversation in the family and among neighbors, and, in particular, supplied the pabulum for political discussions. The few books owned or borrowed were carefully read again and again. The small proprietary libraries furnished some of the most valuable histories and the choicest works in belles-lettres. It was not of rare occurrence to find persons who showed familiarity with Rollin, Ferguson, Gibbon, Robertson, and Hume; and sometimes one might even be met, who could give an orderly account of an entire work of these authors; and there were many who could repeat favorite poems, peradventure even the entire *Night Thoughts* of Dr. Young, if that was the chosen *vade mecum*. Even some children of twelve or fifteen years of age,—barefoot boys who had only “noonings” and the time they might gain by manual dexterity in accomplishing their “stents,”—had perused several of the voluminous historians named above. How will such lads compare in mental strength and vigor with children who willingly read nothing but the most exciting tales or the most intellectual pap made toothsome?

The observation of men and of nature, pursued to good advantage where no unbending usages restrained free development of character, no wrappings of conventionalities gave a uniform semblance to all, where the woods and the waters and the inhabitants thereof had only begun to recognize the dominion of man, quickened too by the necessity of turning to account every item of knowledge that could be gained, was an ample equivalent for the more comprehensive speculations of mental philosophy and the scientific nomenclatures and descriptions of natural history to be learned from the mouth of the lecturer.

Finally, those defective schools of the past generation did place the key of knowledge in the hands of the inquisitive; which is nearly all that the schools of the present day

accomplish, or at least is their most valuable result. With reading, writing, and the elements of arithmetic, and the stimulus of necessity and emulation, and perhaps religious principle added, he who felt any of the inspiration of genius, or who became conscious of a talent that had been improved, might advance with a speedier flight or a slower and more toilsome step up the steep ascent to the temple of knowledge, and sit a crowned king on one of her numberless thrones. Books procured and mastered one at a time, moments of leisure seized and improved, oneness of aim and unflinching perseverance, wrought the result.

It is a plain inference that school education, as the correlate of the professional teacher's labors, usually receives credit to which it is not entitled. As we have elsewhere remarked, with all the agencies for the education and improvement of teachers, the public schools of Europe, with their institutions of government and society, do not turn out such practical and efficient men as our own common schools, acting in concert with our religious, social and political institutions. A boy educated in a district school of New England, taught for a few months in the winter, by a rough, half-educated, but live teacher, who is earning his way by his winter's work in the school-room out of the profession into something which will pay better, and in the summer by a young female, just out of the eldest class of the winter school, and with no other knowledge of teaching than what she may have gathered by observation of the diverse practices of some ten or twelve instructors who must have taught the school under the intermittent and itinerating system which prevails universally in the country districts of New England—a boy thus taught through his school-life, but subjected at home and abroad to the stirring influences of a free press, of town and school district meetings, of constant intercourse with those who are mingling in the world, and in the affairs of public life, and beyond all these influences, subjected early to the wholesome discipline, both moral and intellectual, of taking care of himself, and the affairs of the house and the farm, will have more capacity for business, and exhibit more intellectual activity and versatility than the best scholar who ever graduated from a Prussian school, but whose school-life, and especially the years which immediately follow, are subjected to

the depressing and repressing influences of a despotic government, and to a state of society in which every thing is fixed both by law and the iron rule of custom. But this superiority is not due to the school, but is gained in spite of the school.

Now when the causes which conduced to this superiority are less operative and less general, the improvement of schools becomes doubly important. This can be effected only as the moulders of educational institutions intelligently apprehend their proper aim, or, in other words, the due relation of school education to education in its enlarged sense, and as they succeed in leading teachers to a judicious direction of their efforts, and to the employment of methods adapted to the end in view. Omitting the consideration of the last topic suggested as not embraced in the design of this article, we shall have before us a practical aim, in addition to supplying the criterion for estimating the excellences and the defects of the education of the past and the present, if we consider as well as we may the question,

WHAT IS EDUCATION?

To facilitate the attainment of definiteness and accuracy of the conception, we shall attempt to distinguish the related ideas. And,

1. *Formation of character*, which is the most comprehensive of these related ideas, represents the combined result of human, natural and supernatural agencies in fashioning every lineament of the man in every department of his inner being. The human agency embraces parent, brother, sister, nurse, playmate, teacher, chosen companion, casual acquaintance, in short, all of his kind, contemporaries or predecessors, who have directly or indirectly contributed to the moulding of the man. The natural agency is the external world or physical universe, which in its influence upon persons similarly situated varies with their susceptibility. The supernatural agency comprehends that exercise of the sovereign power of the great First Cause, which places the individual in the special condition and relations that attend him on his introduction into existence and throughout his life, with whatever of direct operations there may be upon the mind, experienced consciously or unconsciously, of divine, angelic or demoniacal origin. The estimate of this last influence will de-

pend upon the theological views entertained. Character is raised to its highest elevation when the prevailing motive in the conduct of life is regard for the perfect will of God; and it is then called *piety*. Education viewed actively is not the correlative of formation of character, neither, viewed as a result, is it identical therewith. However we may employ sensible objects or those only conceived of, it proceeds by human agency alone. Whilst the disorganization of the human constitution has proved beyond the ability of mere education to rectify, on the supposition that perfection of character was attained, education might go on indefinitely. Formation of character gives a certain combination of features or qualities; education presents cultivated susceptibilities and stores of gathered treasures. Strictly, education is always immediate. We may employ another, or assist in preparing him, to educate a third person; but if this is all, we are not ourselves with him educators of that person.

2. *The development of the faculties* is the second related idea. Development is the unfolding of something which had existed only in embryo, by exciting its dormant vital energy or inherent force to activity. The result of the development of the mental faculties is *power*, power, intellectual, moral, and voluntary; power of instigating and power of controlling action. When the moral faculty or conscience controls action in all the relations of a man to his fellow-men, *rectitude* or uprightness is the result. It is the function of education to superintend the development of the faculties, accelerating that of some, circumscribing or restraining that of others, and to regulate them in their exercise. Development, even when regulated by education, must fail to give to man perfection of character, for it neither gives nor takes away, and hence original imperfection must remain, though it may be partially concealed. In an unregulated but stimulated development the proportions of what is fair would be outgrown and obscured by all forms of ugliness.

3. *Training*, of which the third related idea is the conception, is directed specifically to the forming of habits. Thus from the earliest mental training there may proceed the habits of obedience, order, neatness, trust, gentleness, kindness, self-denial, &c.; from corporeal training habits of motion, and physical action in general. Educa-

tion is not, like training, directed exclusively to the forming of habits. This is rather its preliminary work.

4. *Instruction* is the communication of knowledge which may be of value to the recipient, either in itself or as a means to a remoter end. Education gives the discipline which turns knowledge to account. Instruction calls into exercise a sort of passive activity, a reception of facts and a perception of relations as presented. Education trains the pupil to discover relations, and to make deductions from facts, and thus excites an independent activity. Teachers and books instruct when they convey thoughts and explain processes; they educate in so far as they lead the pupil or reader to think for himself and to institute new processes. Instruct a man, and he will become well informed in regard to the subject of the instruction; educate a man, and his mind will be not only furnished, but also disciplined and cultivated in proportion to its capacity and the extent of the process. Precisely the same process may be instruction in one respect and education in another. Often, however, their methods are essentially different, for instruction may simply labor to facilitate to the utmost the acquisition of knowledge, but education, whilst careful to adapt its requirements to the strength of the learner, introducing its severer methods gradually, and never prematurely assigning the abstruser branches of study, only directs the learner how to encounter the difficulties of his path, and leaves him to take every step for himself, aiming to bring him as soon as possible to the condition where he may dispense with all aid. Thus, although instruction and education are inseparable, there may be much instruction where there is very little education, and very little instruction where there is much education. Instruction is limited to what the teacher does; education is measured by what the pupil is rendered competent to perform.

5. *Tuition*, distinctively regarded, has for its end simply advancement in specific branches of study. It is related to education in its restricted sense as a part to a whole. Also, it is objective only.

Education, in its enlarged sense, is the disciplining, cultivating, and furnishing of the mind of man, as a man, and for the particular position which he is to hold. It is thus general and special; general, so far as it seeks to advance man towards the perfection

of his being; special, so far as it is directed to preparation for a particular sphere of activity. Discipline gives trained strength, the ability to exercise developed power at will. Culture brings the mind into the condition, relative to its capacity, to produce what is useful and beautiful and good and true. The furniture of the mind is its general stores. Incidental to the principal objects of education is physical culture. Education regards the body as a casket which must be guarded well, that the contents receive no injury; as a servant to be kept in good condition for the master's benefit.

Education in its restricted sense is that extent of mental discipline, culture and furniture, to be systematically gained under the direction of a teacher, which is requisite to the indefinite improvement of the pupil by himself, or to his independent completion of his preparation for his business in life. It is thus, like education in its enlarged sense, general and special.

This last definition determines the sphere to which the teacher is limited, and which he must occupy as completely as possible. It dictates no uniform course or method. These must be varied to suit the character and circumstances of pupils. It prescribes for each simply the text that is practicable, not every thing which is desirable. Beyond the mere fundamental branches of knowledge it makes the furnishing of the mind a secondary end. It utterly forbids the striving to make every pupil the recipient of all the sciences. In the most extended course of study it marks out the pupil's becoming an adequate self-educator as the limit of the teacher's duties, and the aim for the attainment of which he must strive. It countenances no forcing processes, which generate mere hot-bed developments, and prevent all possibility of the solid growth requisite to convert the tender plant into the majestic tree; and least of all, no measure tending to blunt the sensibilities or sour the disposition. It admits that the most valuable part of education is what is superadded to the labors of the teacher, or goes on independently of him, but it requires of him unceasing watchfulness over his pupils, and consummate wisdom and skill in directing their studies and guiding their efforts. Finally, if it permits time and effort to be devoted chiefly to literary attainments, it implies that all intellectual acquisitions must be made subordinate to moral culture.

We will close this chapter by marking some of the successive steps, agencies, and results, in the development of our present system of public elementary education.

1. As has been already remarked, in the reconstruction of civil society which followed the change from colonies to independent states in confederated and afterward national union, the necessity and wisdom of making some provision for the education of children was generally recognized, and in some instances thoroughly and liberally provided for in the fundamental laws.

The constitution of Massachusetts adopted in 1780 has this provision: "Wisdom and knowledge as well as virtue diffused generally among the body of the people, being necessary for the preservation of their rights and liberties, and as these depend on spreading the opportunities and advantages of education in the various parts of the country, and among the different orders of the people, it shall be the duty of legislatures and magistrates in all future periods of this commonwealth, to cherish the interests of literature and the sciences, and all seminaries, especially the University of Cambridge, public schools, and grammar schools in the towns; to encourage private societies and public institutions, rewards and immunities for the promotion of agriculture, arts, sciences, commerce, trades, manufactures, and a natural history of the country; to countenance and inculcate the principles of humanity and general benevolence, public and private charity, industry and frugality, honesty and punctuality in their dealings; sincerity, good humor, and all social affections and generous sentiments among the people." In the revision of the school laws in 1789, it is provided that "towns of fifty families are required to sustain schools wherein children are taught to read and write, and instructed in the English language, arithmetic, orthography, and decent behavior, for a term equal to one school of six months in each year; every town of one hundred families, twelve months; every town of one hundred and fifty families, eighteen months; and every town of two hundred families twelve months, and in addition thereto sustain a school wherein is taught the Latin, Greek and English languages for twelve months in each year." It is also "made the duty of the president, professors and tutors of the University at Cambridge, preceptors and teachers of academies, and

all other instructors of youth, to take diligent care, and to exert their best endeavors to impress on the minds of children and youth committed to their care and instruction the principles of piety, justice and a sacred regard to truth, love to their country, humanity and universal benevolence, sobriety, industry and frugality, chastity, moderation and temperance, and those other virtues which are the ornament of human society, and the basis upon which the republican constitution is structured; and it shall be the duty of such instructors to endeavor to lead those under their care into a particular understanding of the tendency of the before-mentioned virtues to preserve and perfect a republican constitution, and to secure the blessings of liberty as well as to promote their future happiness, and the tendency of the opposite vices to slavery and ruin."

Vermont in the constitution adopted in 1793 ordains "that a competent number of schools shall be maintained in each town for the convenient instruction of youth, and one or more grammar schools to be incorporated and properly supported in each county," and by subsequent legislation imposed the necessary tax for their support.

New Hampshire in 1789 empowers and requires the selectmen of the several towns to assess an annual tax upon the inhabitants for the support of a school or schools for teaching, reading, writing and arithmetic, and in each county town a grammar school for the purpose of teaching the Greek and Latin languages in addition to the other studies.

Connecticut in 1795, in addition to a special tax for the support of common schools, collectable with the other public taxes, appropriated the avails of the sales of three millions of acres of land belonging to the state and situated in Ohio—since known as the Western Reserve—as a perpetual fund for the same object.

New York in 1795 appropriated \$50,000 annually for the purpose of encouraging and maintaining common schools in the several cities and towns, which were required to raise by tax for the same purpose a sum equal to one-half the amount received from the state.

Pennsylvania in the constitution adopted in 1790 ordains "that the legislature shall provide by law for the establishment of schools throughout the state in such manner

that the poor may be taught gratis;" "and that the arts and sciences shall be promoted in one or more seminaries of learning." The peculiar feature in the constitution and laws of Pennsylvania providing for the free education of the poor instead of common schools, was unfortunately adopted by New Jersey, Delaware, Maryland, and most of the southern states which had not enjoyed from their first beginnings the inestimable advantages of public schools "good enough for the rich and cheap enough for the poor." Owing to the sparseness of their population, their "peculiar institution," and difficulty of establishing good school habits in any community, public schools have never flourished in the southern and south-western states.

Virginia in 1796 passed a general school law, a portion of the preamble of which is as follows: "Whereas, upon a review of the history of mankind, it seemeth that, however favorable a republican government founded on the principles of equal liberty, justice and order may be to human happiness, no real stability or lasting permanency thereof can be rationally hoped for, if the minds of the citizens be not rendered liberal and humane, and be not fully impressed with the importance of those principles from whence these blessings proceed; with a view, therefore, to lay the first foundations of a system of education which may tend to produce those desirable purposes," etc. Georgia, Kentucky and Tennessee passed school laws with aims as generous as those of the above preamble; but the institutions established were for higher learning and the few, and not for the great masses of the community.

Ohio, Indiana, and all of the states formed out of the north-western and Louisiana territories, as they were admitted into the Union, adopted in their organic and early laws provisions for the appropriation of the funds created out of the educational land grants of Congress, before spoken of, to the support of common schools and colleges, on the plan of the eastern states. But it was soon found that it was not sufficient to pass laws, or even appropriate money liberally for the support of schools; those laws must be efficiently and uniformly administered, and the condition of the schools be brought constantly to the attention of the legislature and the people.

2. New York was the first state to create an officer to look after the operations of the school law, and to advise and assist local

school officers in its administration. The appointment by the legislature in 1813 of Gideon Hawley as superintendent of common schools, and his annual reports to the legislature on the working of the system, constitute an important era in the history of public instruction in the United States. Other states created the office, but devolved its administration on some other department already burdened with other and dissimilar duties. In 1826 Massachusetts required returns to be made of the condition of the public schools of each town, and in 1836 instituted a state board of education, with a salaried secretary whose business it was made "to collect information of the actual condition and efficiency of the common schools and other means of popular education, and diffuse as widely as possible throughout every part of the state information of the most approved methods of conducting the education of the young, that they may have the best education that common schools can be made to impart." This example was followed by Connecticut in 1838, and in less than ten years this great interest of public instruction, so far as covered by elementary schools, was recognized as a legitimate department of the government, in all the northern and western states.

Under the able and enthusiastic leadership of Horace Mann, the first secretary of the board of education in Massachusetts, the various plans and suggestions which had been proposed for ten or fifteen years previous, for the improvement of common schools, were matured and applied in the most efficient manner. Conventions of teachers, parents and friends of popular education were held for addresses and discussions, in every state, and in almost every county in every state which had appointed either a single officer, or a board with a paid secretary, to look after this interest. The regular and punctual attendance of all the children of a suitable age at school, the advantages of a gradation of schools, of parental visits to the schools, of an association of the teachers for mutual improvement, and the visiting of each other's schools; the evils arising from an improper location, construction and furniture of school houses, from a diversity of text books in the same study, from a multiplicity of studies in the same school, from the neglect of the young pupils and the primary studies, from a constant change of teachers, from the employment of teachers not properly qualified,

from severe and unnatural punishments, from the want of suitable apparatus, from the mechanical processes of teaching reading, arithmetic, and other studies, from the neglect of moral education, these and other subjects were discussed in official reports, in the public press, and in professional school journals. Out of the more enlightened and interested public opinion of the country, in neighborhoods, villages, and cities, have resulted wise legislation, efficient organization, vigorous administration, and liberal appropriations, in respect to the material outfit of schools; and with these, but not as rapidly or as widely, have grown up better school attendance, more philosophical arrangement of studies, and improved methods of instruction and discipline.

3. Since 1840 the most marked improvement in the organization, administration and instruction of public schools, has been made in the larger cities of the several states, sometimes under the general school law of the state, but generally under special legislation. With the exception of Boston and a few of the other large cities of New England, the system of public schools was altogether inadequate to the educational wants of large communities. Expensive private schools were the main reliance for the education of the children of professional and wealthy families, while a large number of those whose means were inadequate, were left without provision for their instruction. The establishment of schools of different grades for children of different ages and studies, and especially of primary schools for young children under female teachers, and of a high school for the older boys and girls in studies heretofore pursued only in expensive private schools, has greatly increased the attendance and elevated the character of the public schools of our cities. By means of evening schools which have been established in many of our cities, the defective education of many young men has been remedied, and their various employments have been converted into more efficient instruments of self-culture.

4. With the improvement of schools in cities and large villages, the establishment of normal schools, teachers' associations, teachers' institutes, and educational journals, and state and local supervision, the country schools throughout the northern and western states are now in a good and hopeful condition.

CHAPTER IV.

ACADEMIES, HIGH SCHOOLS, AND OTHER INSTITUTIONS OF SECONDARY EDUCATION.

THE first public schools of the American colonies were the free endowed grammar schools and subscription grammar schools; schools for secondary education. Public primary or elementary common schools were of later date, both in chronological order, and as being a logical result of their predecessors of higher grade.

The first school laws, those of Connecticut and Massachusetts, which were subsequent to the establishment by individuals or towns of the classes of schools they referred to, recognized all three grades of educational institutions, both what are at present termed common or elementary, and also secondary or superior; that is to say, common or neighborhood schools, grammar schools, and colleges.

The class of secondary schools, since the very earliest period of their establishment, has been far less cherished and supported, either by public opinion or by legal provisions, than either of the other two classes. Almost universally, the academy, the endowed school, the grammar school, has been wholly left to the support of those wealthier or more learned classes who have been tacitly assumed to have the only use for them; and where any state assistance has been extended to them, it has usually been in the exceptional form of individual acts of incorporation or individual grants of money or land.

It may be observed that such a co-equal public recognition, if extended to the class of secondary schools, would at once produce a definite and important result, in throwing probably half of what may be termed the present secondary course of study back within the course of the elementary grade of schools, and also in bringing back a large number of what are termed colleges into their appropriate grade of secondary institutions.

The noticeable and important fact is moreover thus brought out, that public opinion in the United States has never, up to the present time, demanded or recognized any universal privilege of education beyond that in the merest rudiments of it.

This neglect has of course caused the existing almost entire deficiency of recorded statistics of schools of this class. Such sta-

tistics are not accessible at all, except in the single state of New York, and even there, only from such secondary institutions as are obliged to furnish them as a condition of their receipt of a portion of the literature fund. This remark is not applicable to the grade of schools known as public high schools, for boys or girls, or both, in several of our larger cities; but these schools, few in number and of modern origin, are not so much the outgrowth of popular feeling, as the creations of a few intelligent friends of public education, in advance of any general demand for this class of institutions. Although not recognized generally as part of our systems of public instruction, schools of the former class have increased rapidly, and now exist in almost every village in the land, and their aggregate number in 1850, according to the census of that year, will be seen in the table on page 451.

The progress of this class of schools, in respect to studies, books, and equipment generally, and methods of instruction and discipline, can be readily measured by any one who will look into the best academy or public high school in his neighborhood, and then read the following communications—the first by the Hon. Josiah Quincy, respecting one of the earliest institutions of the class known as academies; and the other two by eminent public men, respecting the public schools, and particularly the Latin school of Boston, as it was prior to or about the beginning of the present century, and at that time pronounced “the best on the American continent.”

“MR. BARNARD: *Dear Sir*—You ask briefly the position of Phillips Academy as to studies, text-books, methods, and discipline. That academy was founded in the year 1778, in the midst of the war of the Revolution, by the united contributions of three brothers—Samuel, John, and William Phillips—all of them men of property according to the scale of that day, and all of a liberal spirit toward every object, religious, moral, or educational. But the real author and instigator of that foundation was the only son of the first of the above-named, who was known during the early period of his life by the name of *Samuel Phillips, Junior*. He was, during his whole life, one of the most distinguished, exemplary, and popular men in Massachusetts; active, spirited, influential, and ready, and a leader in every good work;

and he had the control of the hearts of his father and two uncles, and was undoubtedly the influential spirit giving vitality to the plan of that institution. There was only one academy in the state at that time—Dummer Academy at Newbury—which, although it had sent forth many good scholars, was then going to decay; and the beautiful and commanding site in the south parish of Andover which that institution now occupies, was unquestionably one of the causes of the idea of the institution as well as of its locality. Eliphalet Pearson had been educated at Dummer Academy, was distinguished for his scholarship and zeal in the cause of classical learning; Samuel Phillips, jr., had formed an intimacy with him at college, though in different classes, and entertained a high opinion both of his literary attainments and spirit of discipline. Phillips Academy was projected with reference to his becoming its first master; and his aid was joined with that of his friend Phillips in forming the constitution of the academy.

“The time of its foundation was unquestionably most inauspicious to its success, but young Phillips was of a spirit that quailed before no obstacles. It was designed to be a model institution of the kind, and no pains were omitted to secure its success; and notwithstanding the uncertainties of the political aspect of the time and the perpetually increasing depreciation of paper money, it was sustained in great usefulness and prosperity. I was sent to that academy within a month after its opening, in May, 1778, being the seventh admission on its catalogue. I had just then entered upon my seventh year, and was thrust at once into my Latin at a period of life when noun, pronoun, and participle were terms of mysterious meaning which all the explanations of my grammars and my masters for a long time vainly attempted to make me comprehend. But the laws of the school were imperious. They had no regard for my age, and I was for years submitted to the studies and discipline of the seminary, which, though I could repeat the former, through want of comprehension of their meaning, I could not possibly understand. I was sent to the academy two years at least before I ought to have been. But William Phillips was my grandfather; it was deemed desirable that the founders of the academy should show confidence in its advantages; I was, therefore, sent at once, upon its first opening, and I

have always regarded the severe discipline to which I was subjected, in consequence of the inadequacy of my years to my studies, as a humble contribution toward the success of the academy.

“The course of studies and text-books I do not believe I can from memory exactly recapitulate; I cannot, however, be far out of the way in stating that ‘Cheever’s Accidence’ was our first book; the second, ‘Corderius;’ the third, ‘Nepos;’ then, if I mistake not, came ‘Virgil.’ There may have been some intermediate author which has escaped my memory, but besides Virgil I have no recollection of any higher author.

“Our grammar was ‘Ward’s,’ in which all the rules and explanations are in Latin, and we were drilled sedulously in writing this language far enough to get into the university. Our studies in Greek were very slight and superficial. Gloucester’s Greek Grammar was our guide in that language, and a thorough ability to construe the four Gospels was all required of us to enter the college.

“These are the best answers I can give to your inquiries on the subject of ‘studies and text-books,’ but I am not confident that my memory serves me with exactness. Our preparation was limited enough, but sufficient for the poverty and distracted state of the period.

“Of ‘methods and discipline,’ for which you inquire, I can only say that the former was strict and exact, and the latter severe. Pearson was a convert to thorough discipline; monitors kept an account of all of a student’s failures, idleness, inattention, whispering, and like deviations from order, and at the end of the week were bestowed substantial rewards for such self-indulgences, distributed upon the head and hand with no lack of strength or fidelity.

“In that day arithmetic was begun at the university. The degree of preparation for college and the amount of the studies within it are not worthy of remembrance when compared with the means of acquirement now presented to the aspiring student.

“Your other inquiries I should be happy to make the subject of reply, but long cessation of familiarity with the objects to which they relate makes me dubious of my power to add any thing important to their history. My knowledge of the common schools of Boston was obtained only during the vacations of the academy, and had chief refer-

ence to improvement in my writing. Their advantages were few enough and humble enough; the education of females very slight, and limited to reading, writing, and the earlier branches of arithmetic.

"The interests of schools and of education were, thirty years ago, subjects of my thought and writing; but the lapse of time and the interposition of other objects and new duties deprive me of the power of aiding your researches on these subjects, which are, however, easily and far better satisfied by the active men of the day. Wishing you all success in these wise and noble pursuits,

"I am, very truly,

"Your friend and servant,

"JOSIAH QUINCY."

"Boston, Dec. 1st, 1860."

The following "Memorandum of an eminent clergyman, who was educated in the best schools of Boston just before the Revolution," we copy from a volume of the "Massachusetts Common School Journal," vol. xii., pp. 311, 312. The notes are by the editor of the Journal, Wm. B. Fowle:

"At the age of six and a half years, I was sent to Master John Lovell's Latin school. The only requirement was reading well; but, though fully qualified, I was sent away to Master Griffith, a private teacher, to learn to read, write and spell. I learned the English Grammar in Dilworth's Spelling Book by heart. Griffith traced letters with a pencil, and the pupils inked them.

"Entered Lovell's school at seven years. Lovell was a tyrant, and his system one of terror. Trouncing* was common in the

school. Dr. Cooper was one of his early scholars, and he told Dr. Jackson, the minister of Brookline, that he had dreams of school till he died. The boys were so afraid they could not study. Sam. Bradford, afterward sheriff, pronounced the *P* in *Ptolemy*, and the younger Lovell rapped him over the head with a heavy ferule.*

"We studied Latin from 8 o'clock till 11, and from 1 till dark. After one or two years, I went to the town school, to Master Holbrook, at the corner of West street, to learn to write; and to Master Proctor, on Pemberton's Hill, in the south-east part of Scollay's Building. My second, third, and fourth year, I wrote there, and did nothing else. The English boys alone were taught to make pens. Griffith was gentle, but his being a private teacher accounts for it.

"The course of study was, grammar; Esop, with a translation; Clarke's Introduction to writing Latin; Eutropius, with a translation; Corderius; Ovid's Metamorphoses; Virgil's Georgics; Æneid; Cæsar; Cicero. In the sixth year I began Greek, and for the first time attempted English composition, by translating Cæsar's Commentaries. The master allowed us to read poetical translations, such as Trappe's and Dryden's Virgil. I was half way through Virgil when I began Greek with Ward's Greek Grammar.

"After Cheever's Latin Accidence, we took Ward's Lily's Latin Grammar. After the Greek Grammar, we read the Greek Testament, and were allowed to use Beza's Latin translation. Then came Homer's Iliad, five or six books, using Clarke's translation with notes, and this was all my Greek education at school. Then we took Horace, and composed Latin verses, using the Gradus ad Parnassum. Daniel Jones was the first Latin scholar in 1771 or 1772,

* "Trouncing was performed by stripping the boy, mounting him on another's back, and whipping him with birch rods, before the whole school. James Lovell, the grandson of John, once related to us the following anecdote, which shows the utility of corporal punishment! It seems that a boy had played truant, and Master John had publicly declared that the offender should be trounced. When such a sentence was pronounced, it was understood that the other boys might seize the criminal, and take him to school by force. The culprit was soon seized by one party, and hurried to the master, who inflicted the punishment without delay. On his way home, the culprit met another party, who cried out, 'Ah, John Brown,' or whatever his name was, 'you'll get it when you go to school!' 'No, I shan't,' said the victorious boy, who felt that he had got the start of them, 'No, I shan't, for I've got it,' and, as he said this, he slapped his hand upon the part that had paid the penalty, thus, as the poet says, 'suits the action to the word.'"

* "We saw this done by another Boston teacher, about thirty years ago, and when we remonstrated with him upon the danger of inflicting such a blow, upon such a spot, 'O, the catiffs,' said he, 'it is good for them!' About the same time, another teacher, who used to strike his pupils upon the hand so that the marks and bruises were visible, was waited upon by a committee of mothers, who lived near the school, and had been annoyed by the outcries of the sufferers. The teacher promised not to strike the boys any more on the *hand*, and the women went away satisfied. But, instead of inflicting blows upon the hand, he inflicted them upon the soles of the feet, and made the punishment more severe."

and he was brother to Thomas Kilby Jones, who was no scholar, though a distinguished merchant afterward.

"I entered college at the age of fourteen years and three months, and was equal in Latin and Greek to the best in the senior class. Xenophon and Sallust were the only books used in college that I had not studied. I went to the private school from 11 to 12 A. M., and to the public from 3 to 5 P. M.

"The last two years of my school life, nobody taught English Grammar or Geography, but Col. Joseph Ward (son of Deacon Joseph Ward, of Newton, West Parish, blacksmith,) who was self-taught, and set up a school in Boston. He became aid to General Ward when the war commenced, and did not teach after the war.

"I never saw a map, except in Cæsar's Commentaries, and did not know what that meant. Our class studied Lowth's English Grammar at college. At Master Proctor's school, reading and writing were taught in the same room, to girls and boys, from 7 to 14 years of age, and the Bible was the only reading book. Dilworth's Spelling Book was used, and the New England Primer. The master set sums in our MSS. but did not go farther than the Rule of Three.

"Master Griffith was a thin man, and wore a wig, as did Masters Lovell and Proctor, but they wore a cap when not in full dress. James Lovell was so beaten by his grandfather John, that James the father rose and said, 'Sir, you have flogged that boy enough.' The boy went off determined to leave school, and go to Master Proctor's; but he met one of Master Proctor's boys, who asked whither he was going, and when informed, warned him not to go, for he would fare worse."

Hon. Edward Everett, in an address at the Annual School Festival in Faneuil Hall in 1852, gives the following account of the educational advantages he enjoyed in early life:—

"It was fifty-two years last April since I began, at the age of nine years, to attend the reading and writing schools in North Bennett street. The reading school was under Master Little, (for 'Young America' had not yet repudiated that title,) and the writing school was kept by Master Tileston. Master Little, in spite of his name, was a giant in stature—six feet four, at least—and

somewhat wedded to the past. He struggled earnestly against the change then taking place in the pronunciation of *u*, and insisted on saying *monooment* and *natur*. But I acquired, under his tuition, what was thought in those days a very tolerable knowledge of Lindley Murray's abridgment of English grammar, and at the end of the year could parse almost any sentence in the 'American Preceptor.' Master Tileston was a writing master of the old school. He set the copies himself, and taught that beautiful old Boston handwriting, which, if I do not mistake, has, in the march of innovation, (which is not always the same thing as improvement,) been changed very little for the better. Master Tileston was advanced in years, and had found a qualification for his calling as a writing master, in what might have seemed at first to threaten to be an obstruction. The fingers of his right hand had been contracted and stiffened in early life, by a burn, but were fixed in just the position to hold a pen and a penknife—and nothing else. As they were also considerably indurated, they served as a convenient instrument of discipline. A copy badly written, or a blotted page, was sometimes visited with an inflection which would have done no discredit to the beak of a bald eagle. His long, deep desk was a perfect curiosity-shop of confiscated balls, tops, penknives, marbles and Jews-harps—the accumulation of forty years. I desire, however, to speak of him with gratitude, for he put me on the track of an acquisition which has been extremely useful to me in after life—that of a plain, legible hand. I remained at these schools about sixteen months, and had the good fortune in 1804 to receive the Franklin medal in the English department. After an interval of about a year, during which I attended a private school kept by Mr. Ezekiel Webster, of New Hampshire, and on an occasion of his absence, by his ever memorable brother, Daniel Webster, at that time a student of law in Boston, I went to the Latin school, then slowly emerging from a state of extreme depression. It was kept in School street, where the Horticultural Hall now stands. The standard of scholastic attainment was certainly not higher than that of material comfort in those days. We read pretty much the same books—or of the same class—in Latin and Greek, as are read now, but in a very cursory and superficial manner. There was no attention paid to the philoso-

phy of the languages—to the deduction of words from their radical elements—to the niceties of construction—still less to prosody. I never made a hexameter or pentameter verse, till, years afterward, I had a son at school in London, who occasionally required a little aid in that way. The subsidiary and illustrative branches were wholly unknown in the Latin school in 1805. Such a thing as a school library, a book of reference, a critical edition of a classic, a map, a black-board, an engraving of an ancient building, or a copy of a work of ancient art, such as now adorn the walls of our schools, was as little known as the electric telegraph. If our children, who possess all these appliances and aids to learning, do not greatly excel their parents, they will be much to blame.”

CHAPTER V.

COLLEGES.

THE colleges of the United States were, at the close of the Revolutionary war, seven in number. They had been founded with the design of providing for the new commonwealths the means of a training for the young men, substantially similar to that afforded by the universities at home. Their course of study was four years in length, and was at first decidedly theological in character, and subsequently more and more secularized. The average age of those entering was somewhat less than now; and they conferred, as at present, degrees in arts in course, and honorary ones in arts, law, and divinity.

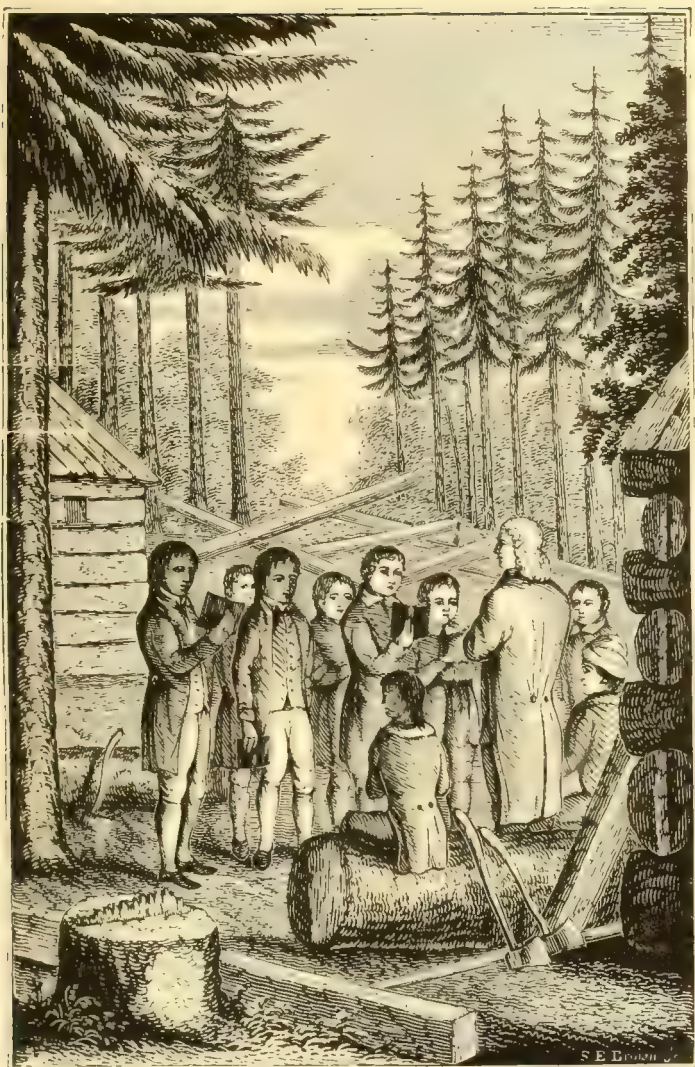
With the growth of the United States they have rapidly increased in number, being supported, beyond the receipts for tuition, either by endowments raised for each among the denomination to which it belongs, or by the proceeds of state gifts of lands or money. The number of this class of institutions incorporated with power to confer academic honors, exceeds two hundred. The length of their course of study remains the same, and indeed this is the case in all their essential characteristics. Although there has been a gradual elevation of the standard of acquirements made requisite for entrance, this preliminary examination has not been sufficiently exacting and uniform. As their funds and the number of their students have enlarged, they have shown a tendency, not to increase the length and completeness of their

course of study, but rather to multiply the number of studies attempted to be taught, by adding them to the undergraduate course; and in a few instances also to annex special schools in one or another department, such as law, medicine, theology, and the application of science to industrial occupations.

Mr. Everett gives the following picture of college life at Harvard as it was fifty years ago:—

“But short as the time is since I entered college (only half as long as that which has elapsed since the close of the seven years' war), it has made me the witness of wonderful changes, both materially and intellectually, in all that concerns our *Alma Mater*. Let me sketch you the outlines of the picture, fresh to my mind's eye as the image in the *camera*, which the precincts of the college exhibited in 1807. The Common was then uninclosed. It was not so much traversed by roads in all directions; it was at once all road and no road at all,—a waste of mud and of dust, according to the season, without grass, trees, or fences. As to the streets in those days, the ‘Appian Way’ existed then as now; and I must allow that it bore the same resemblance then as now to the *Regina Viarum*, by which the consuls and proconsuls of Rome went forth to the conquest of Epirus, Macedonia, and the East.

“As to public buildings in the neighborhood of the university, with the exception of the Episcopal church, no one of the churches now standing was then in existence. The old parish church has disappeared, with its square pews, and galleries from which you might almost jump into the pulpit. It occupied a portion of the space between Dane Hall and the old Presidential House. I planted a row of elm and oak trees a few years ago on the spot where it stood, for which, if for nothing else, I hope to be kindly remembered by posterity. The wooden building now used as a gymnasium, and, I believe, for some other purposes, then stood where Lyceum Hall now stands. It was the county court-house; and there I often heard the voice of the venerable Chief Justice Parsons. Graduates' Hall did not exist; but on a part of the site, and behind the beautiful linden trees still flourishing, was an old black wooden house, the residence of the professor of mathematics. A little further to the north, and just at the corner of Church street, which was not then opened, stood what was dignified in the annual col-



FOUNDING OF DARTMOUTH COLLEGE. IN 1769. *Engraved in 1839.*

lege catalogue (which was printed on one side of a sheet of paper, and was a novelty) as 'The College House.' The cellar is still visible. By the students this edifice was disrespectfully called 'Wiswall's Den,' or, for brevity, 'the Den.' I lived in it in my freshman year. Whence the name of 'Wiswall's Den' was derived, I hardly dare say; there was something worse than 'old foggy' about it. There was a dismal tradition that, at some former period, it had been the scene of a murder. A brutal husband had dragged his wife by the hair up and down the stairs, and then killed her. On the anniversary of the murder—and what day that was no one knew—there were sights and sounds—flitting garments dragged in blood, plaintive screams, *stridoe fieri tractaque catenæ*—enough to appal the stoutest sophomore. But, for myself, I can truly say, that I got through my freshman year without having seen the ghost of Mr. Wiswall or his lamented lady. I was not, however, sorry when the twelvemonth was up, and I was transferred to the light, airy, well-ventilated room, No. 20 Hollis; being the inner room, ground-floor, north entry of that ancient and respectable edifice."

The tables on pages 451-3 exhibit the number, date of foundation, and statistics of our American colleges in several important particulars.

CHAPTER VI.

PROFESSIONAL, SCIENTIFIC, AND SPECIAL SCHOOLS.

As the body of human knowledge increased in extent, and filled out in detail, it subdivided by a natural process into a greater and greater number of sciences, as did the industrial side of life into a greater and greater number of employments. A subdivision and increase in the number of schools, preparatory to the business of life, naturally accompanied this process.

The colleges of the United States, according to this law of development, were in their early day designed primarily to train future clergymen, and secondarily to train those intending to enter the public service. For a long time college graduates had no means of enjoying further instruction in either of the then recognized learned professions, but by residing near or in the family of some eminent

clergyman, lawyer, or physician, acting as his assistant and receiving his instructions. Then, when they considered themselves fit, or an invitation came, they took their place in the ranks of their profession. Gradually the necessity of special opportunities of instruction in the principles, and their diverse and complicated applications, led to the establishment of schools of theology, medicine, and law; and still later, of special courses of instruction, and finally, of special schools for the practical chemist, geologist, civil and military engineer, agriculturist and teacher. This department of education is not yet aided systematically in any state, and is hardly recognized by a majority of the states in their systems of public instruction. Most of this class of institutions have been established by denominational or professional associations, or by the liberality of individuals in advance of or as the inducement to legislative aid.

CHAPTER VII.

THEOLOGICAL SCHOOLS.

THE future clergyman, in the American colonies, had already studied theology in his college course. It was probably common for graduates to serve what may be well enough termed an apprenticeship under some eminent clergyman, after leaving college. During the first half of the eighteenth century, the custom grew up of subjecting the candidate for the ministry to examination by a number of ministers, and licensing him to preach as candidate. Dr. Bellamy first introduced at his house at Bethlem, Connecticut, the plan of giving something like a regular course of instruction to students in theology. A little later the practice became quite general, and was confirmed by the gradual elimination of its theological character from the course of study in the colleges.

The first separate theological school in the United States was that at Andover, founded and opened in 1807. The thorough three years' course of study here established soon did away with the comparatively inefficient and superficial apprenticeship scheme, which afforded a professional training of twelve, six, or even only three months.

Of previous departmental or imperfect provisions for specific ministerial training, should be mentioned the academy known as "Log College," of Rev. William Tennent, at

Neshaminy, Bucks county, Pa., opened about 1728; the preparatory school opened by Rev. John Smith in the west of Pennsylvania in 1778, afterward under Rev. J. Anderson, D. D.; William and Mary College, which included a professorship of divinity in 1693; the foundation of the Hollis professorship of divinity at Harvard College in 1721; and that of the Livingston professorship of divinity at Yale College in 1746.

The table, altered into chronological succession from the American Almanac, 1861, gives the growth of this class of special schools.

CHAPTER VIII.

LAW SCHOOLS.

THE professional education of colonial lawyers was equally unscientific, with the exception of the few who obtained a legal education at the Middle or Inner Temple in London, those inns of court being the favorite resorts of American students. Law, indeed, was then scarcely considered a liberal science in this country, and the profession was in more than one instance discouraged or actually forbidden by colonial constitutions or laws. Thus, in 1660, Virginia, by her house of burgesses, voted for "the total ejection of mercenary attorneys;" Massachusetts, in 1663, prohibited "usual and common attorneys in any inferior court," from being members of the legislature; and Locke's constitution for Carolina permitted "no one to plead another man's cause." The only professional training between the college course and actual practice was in the office of some practitioner already established, where the aspirant served for an indefinite period as an attorney's clerk, usually learning to draw instruments, and obtaining a desultory knowledge of forms, technics and special pleading, but very seldom pursuing any regulated course of study or systematically mastering his subject.

The first separate institution for legal instruction was the celebrated law school at Litchfield, Connecticut, established by Judge Reeve in 1784, taught by him alone until 1798, then together with Judge Gould until a little before Judge Reeve's death in 1823, and afterward by Judge Gould alone until 1827. Seven hundred and fifty students in all studied law in this school; who, scattered over the whole country, carried with them

and instilled into the profession at large the idea of a special and systematic training for the practice of law.

We append a table, altered from the American Almanac for 1861, of the existing law schools or collegiate departments in the United States, in the order of their foundation. It should, however, be observed that some legal studies were included in the original scheme of William and Mary College, founded 1693, and the law course became of some positive value by improvements about 1730. Also, that a law professorship was founded in the College of Philadelphia in 1790; a professor of law appointed at Yale College in 1801; and the Royall Professorship of Law at Harvard, founded in 1815.

CHAPTER IX.

MEDICAL SCHOOLS.

MEDICAL schools are of quite recent date; and the training of the young physician was of a very irregular character during the colonial period. Degrees of Doctor of Medicine were possessed by a very few practising physicians, who had studied at Edinburgh, Leyden, or other European schools. The few eminent physicians who were trained exclusively in the colonies, were to a great extent followers of a natural gift and tendency, which went far to supply their lack of school learning. Young men proposing to become physicians, practised in the offices and under the instruction of established physicians. Down to the middle of the 18th century, it was the frequent practice, in Connecticut, at least, to obtain a formal license from the general court, which was commonly granted on petition of the aspirant, reinforced by testimonials from the freemen of his town, the town officers, or practising physicians. Sometimes the only credentials of the beginner, were the certificate of the physician with whom he had studied. After college courses of medical lectures were established, a license from the faculty was given, which served instead of the subsequent diploma.

The earliest collegiate medical department in the United States was that of the University of Pennsylvania in 1765. Dr. Shippen had lectured on anatomy in 1762.

We add a chronological table, altered from the American Almanac for 1861, of the medical schools of the United States.

CHAPTER X.

MILITARY AND NAVAL SCHOOLS.

THE experience of the Revolutionary war occasioned a very general conviction among the officers of the American army, of the necessity for such a provision for the military education of native officers as would relieve the United States from a dependence upon professionally trained soldiers of foreign birth. The idea of a military school of some kind, to be connected with each United States arsenal, was entertained at the close of the war among the officers.

In the spring of 1783, General Washington requested from a number of leading officers, statements of their views on all subjects connected with the peace establishment of the United States army. In reply to this request, Colonel Timothy Pickering, then quartermaster-general, drew up an able and interesting memoir, which contains, it is believed, the first suggestion of a single central government military academy, and he also suggested West Point as a proper location for it.

President Washington's annual address to Congress of December 3, 1793, asks "whether a material feature in the improvement of a system of national defence ought not to be to afford an opportunity for the study of those branches of the military art, which can scarcely ever be attained by practice alone."

An act of Congress of May 9, 1794, authorized a corps of four battalions of artillery and engineers, to each of which were to be attached eight cadets. This was the first introduction into the military service of the United States of this term, which may be defined to signify a grade of officers between the highest non-commissioned officer, a sergeant, and the lowest commissioned one, an ensign. For the use of this corps and cadets, the secretary of war, Colonel Pickering, was authorized to procure the necessary books and apparatus. The secretary, in 1796, reports that this organization is important, and should be as stationary as practicable, with a view to instruction.

President Washington's last annual speech to Congress, December, 1796, again urged strongly the establishment of a military academy. In April, 1798, the corps of artillery and engineers was increased by an additional regiment, and the number of cadets enlarged to fifty-six. In July following, four teachers were by Congress author-

ized to be employed in that regiment for instruction in science and art. Some officers and men were collected at West Point, and a sort of military school opened, which, however, acted with little efficiency, owing to the want of preparatory training, and of organization.

Secretary of War McHenry, in a report on the organization of the army, made during the expectation of a war with France, dated December 24, 1798, lamented the want of engineers and artillerymen trained at home. In January, 1800, the same officer laid before the President, who transmitted it to Congress, a plan for establishing a military academy. After referring to the imperfect steps already taken in this direction, he proceeds to suggest that the proposed academy shall consist of a "fundamental school," to instruct in such departments of science as are necessary in common in all the arms of the military force; and three special schools, one of engineers and artillerymen, one of cavalry and infantry, and one of the navy. The institution was to be in charge of a director-general, four directors, twelve professors, and nine other instructors. This school, so far as Secretary McHenry recommended its immediate establishment, was to accommodate annual classes of one hundred pupils each, for courses of four and five years.

The Military Academy at West Point, according to Colonel Williams' report in 1808, was first opened in 1801, as a "mathematical school for the few cadets that were then in service," and under a private citizen. In 1802, an act of Congress separated the artillery and engineers, distributing the cadets of the former class among the twenty companies of that arm, and constituted the engineers the Military Academy, making it consist of seven officers and ten cadets.

The operations of the school continued to be deficient in order and efficiency for some years, still for want of proper and energetic administration, and a well adjusted course of study. In 1812, it was much enlarged, and its organization quite changed. The period from 1817 to 1824, however, during which a thorough course of theoretical and practical studies, properly adapted to the military profession, was for the first time introduced, marks the establishment of the academy as a military and scientific school of high grade and value.

The academy, in 1860, was organized under a superintendent, who is commandant of the

sociation of persons engaged and interested in the business of instruction;" and, in pursuance of its votes, an adjourned meeting was held at Boston in August following, at which its constitution and name were adopted, and its first course of lectures delivered. It was incorporated in 1831 by the legislature of Massachusetts, and has received an annual grant from that state. Its series of annual meetings is still continued, and its accompanying series of annual volumes of lectures has now reached the 31st, and includes a valuable mass of useful theoretical and practical discussions.

During the period of educational interest which produced the American Institute of Instruction, many conventions and meetings of teachers and friends of education assembled in different parts of the country, to consult and debate upon means of improvement for schools and teachers. Among the more earnest and efficient of these may be named the Windham County (Conn.) Convention, which met in 1826; the Hartford Society for the Improvement of Common Schools, formed in 1827, and among whose members were Messrs. Hooker, Gallaudet, W. C. Woodbridge, and others; the Pennsylvania Society for the Promotion of Public Schools, formed in 1828; and the Convention of the Teachers of New York, which met at Utica in 1832. These bodies frequently possessed scarcely more than an annual existence, meeting from year to year in pursuance of a new call. Their efforts, however, and the evident capacities of such organizations for usefulness, led directly to the subsequent formation of that class of educational societies known as "State Teachers' Associations." Of these, the Massachusetts State Teachers' Association, and the Rhode Island Institute of Instruction, were organized in 1845; the Ohio State Teachers' Association in 1847; and others have followed, until at present there are no less than twenty-seven State Teachers' Associations, some of them acting with remarkable efficiency for the professional improvement of teachers. In connection with these state bodies, county associations exist in several states, some of them enjoying state aid, and many of them useful co-laborers in the educational field with the state associations with which they are affiliated.

The first proposition in this country for a periodical to be devoted to education was made by Rev. Samuel Bacon, a native of Sturbridge, Massachusetts, who, in 1812, is-

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Seven years afterward, in March, 1823, Rev. Samuel Read Hall opened at Concord, Vermont, the first teachers' seminary in the United States; an unpretending little school, planned in consequence of his own observations upon the wants of teachers, intended for the improvement of teachers in and near his own town, and including a model class of juvenile pupils.

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sylvania, issued various pamphlets and newspaper articles, ably urging the necessity, practicability, and advantages of institutions for the professional training of teachers.

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In the next year, 1827, Governor Clinton recommended to the legislature of the state of New York the establishment of a normal school, and an act was passed for that purpose. It was, however, strongly opposed by Hon. John C. Spencer, who succeeded in preventing it from going into operation, and in causing the adoption instead of the plan of teachers' departments in academies.

The earliest instance of a teachers' institute in this country, though not then so named, was the experimental one gathered at Hartford, Connecticut, in October, 1839, by the means and at the expense of the then superintendent of common schools in Connecticut, in order to prove the practicability and usefulness of the plan. The result was entirely satisfactory. A similar class, or "temporary normal school," was successfully conducted during eight weeks by Mr. Stephen R. Sweet, at Kingsboro, Fulton county, New York, commencing on the 6th of September, 1842. J. S. Denman, Esq., school superintendent of Tompkins county, New York, urged a similar class upon the attention of the Tompkins County Teachers' Association in October, 1842, and a teachers' institute, supposed by him to be the first in the state and in the world—and probably the first expressly so called—was opened under his direction in that county in April, 1843, and profitably conducted during two weeks.

Institutes were held in many places in New York during the following five years, under the auspices of school officers and teachers; and at the end of that time, in November, 1847, an act of the legislature made them part of the legal school system, and provided a trifling annual appropriation to aid in holding them in each county.

Under the influence of earnest efforts by teachers and educators during 1846, the legislature of Connecticut, in May, 1847,

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sylvania, issued various pamphlets and newspaper articles, ably urging the necessity, practicability, and advantages of institutions for the professional training of teachers.

In February, 1826, a committee was appointed by the legislature of Massachusetts to report a plan for an institution to instruct in practical arts and sciences. This committee included in the plan recommended by them a department for the professional training of teachers. This scheme was not, however, carried into operation.

In the next year, 1827, Governor Clinton recommended to the legislature of the state of New York the establishment of a normal school, and an act was passed for that purpose. It was, however, strongly opposed by Hon. John C. Spencer, who succeeded in preventing it from going into operation, and in causing the adoption instead of the plan of teachers' departments in academies.

The earliest instance of a teachers' institute in this country, though not then so named, was the experimental one gathered at Hartford, Connecticut, in October, 1839, by the means and at the expense of the then superintendent of common schools in Connecticut, in order to prove the practicability and usefulness of the plan. The result was entirely satisfactory. A similar class, or "temporary normal school," was successfully conducted during eight weeks by Mr. Stephen R. Sweet, at Kingsboro, Fulton county, New York, commencing on the 6th of September, 1842. J. S. Denman, Esq., school superintendent of Tompkins county, New York, urged a similar class upon the attention of the Tompkins County Teachers' Association in October, 1842, and a teachers' institute, supposed by him to be the first in the state and in the world—and probably the first expressly so called—was opened under his direction in that county in April, 1843, and profitably conducted during two weeks.

Institutes were held in many places in New York during the following five years, under the auspices of school officers and teachers; and at the end of that time, in November, 1847, an act of the legislature made them part of the legal school system, and provided a trifling annual appropriation to aid in holding them in each county.

Under the influence of earnest efforts by teachers and educators during 1846, the legislature of Connecticut, in May, 1847,

made an appropriation which enabled the superintendent, Hon. S. P. Beers, to provide for the holding of institutes in each county of the state in the following autumn; and they have since formed part of the state system for training teachers.

Institutes were introduced into Massachusetts in the autumn of 1846, as part of the comprehensive school reform which spread through that state under Horace Mann's secretaryship of the Board of Education. Those of 1846 were held in consequence of Hon. Edmund Dwight's gift of \$1000 for the purpose. In the next year the legislature appropriated a sum to continue the plan, and they were thus incorporated into the public school system of the state of Massachusetts.

The economy and efficiency of this agency in training teachers were so great and manifest, that they quickly spread into the other eastern states, and into many of the middle and western ones; and at present may be considered a fixed feature of the American system of special training for teachers. In 1859, it was estimated that upward of 20,000 teachers were assembled under this plan of organization for instruction in their professional duties.

CHAPTER XII.

SCHOOLS OF SCIENCE FOR ENGINEERS, GEOLOGISTS, ETC.

For many years the government school for training army officers, founded in 1802, and known as the United States Military Academy at West Point, stood alone as a seminary for advanced education, in which classical instruction yielded its pre-eminence to mathematical and scientific culture. In 1824, the Rensselaer Polytechnic Institute was founded at Troy, N. Y., and furnished civilians with the means of education in some measure corresponding to but yet much lower than the military school at West Point. More than twenty years afterward, in 1846, the corporation of Yale College established two professorships, which soon formed the nucleus of the Yale Scientific School; and about the same time a gift of \$50,000, subsequently increased to double that amount, by Abbott Lawrence, enabled the corporation of Harvard University to establish in 1847 the Lawrence Scientific School. With-

in a short time Dartmouth College was enabled to go forward in the same direction, by a bequest of \$50,000 received from Abiel Chandler, at his decease in 1851, endowing the Chandler Scientific School. As these three institutions naturally form a group by themselves, providing instruction of an advanced character in several different branches of science, a brief sketch will be given of each one; but there are a variety of less advanced schools, and of schools devoted to a single practical object, like the agricultural schools at Lansing, Mich., and Ovid, N. Y., which will be noticed under their appropriate head.

In August, 1846, the corporation of Yale College established two professorships, one of agricultural chemistry, the other of chemistry applied to the arts; to the first of which was appointed John Pitkin Norton; to the latter Benjamin Silliman, Jr. At the same time a committee was appointed to consider the expediency of forming a "Department of Philosophy and the Arts" in connection with the university. In August, 1847, this committee reported that it was expedient to form such a department, for the instruction of other than undergraduate students. Accordingly, the department was organized for the purpose of providing instruction in philosophy, philology, history and natural science, etc. The branches of chemistry and engineering were embraced in one section, under the title of the Yale Scientific School. The professors, before appointed, entered on their duties in the autumn of 1847. In 1852, the corporation established in this department the degree of Bachelor of Philosophy, to be conferred after a two years' connection with the school, and a satisfactory examination in at least three branches of study. In September, 1852, the school suffered a severe loss in the death of its devoted friend, Professor J. P. Norton, who bequeathed to it his collection of books and apparatus. New professorships have from time to time been established, and additional instructors appointed, but the school has lacked until 1860 sufficient accommodations and the pecuniary means necessary for expansion. By the liberality of Joseph E. Sheffield, Esq., of New Haven, it is now provided with a spacious building, especially adapted to its purposes, and a fund of \$100,000 for sustaining its courses of instruction. To the latter fund other gentlemen have contributed. This building (first opened in September, 1860) contains,

besides the usual lecture rooms, extensive analytical and metallurgical laboratories, and halls for agricultural and technological museums. Opportunity is afforded in the school for pursuing a general scientific course, extending through three years, or special courses in physics, chemistry, industrial mechanics, and engineering, which occupy two years each.

The degree of Bachelor of Philosophy is now conferred on those who have completed either the general course or one of the special courses in the scientific school, and have passed a satisfactory examination. The degree of Civil Engineer is conferred on those who have completed, besides the special course in engineering, a higher course of one year. It is also proposed to confer a higher degree, that of Doctor of Philosophy, on those who in their residence and their scholarship conform to the requirements of the department. In February, 1860, a course of agricultural lectures was given under the patronage of the school. The faculty of the school now consists of the president of the college, a professor of civil engineering, a professor of natural history, a professor of general and applied chemistry, a professor of industrial mechanics and physics, a professor of organic chemistry, a professor of modern languages, a professor of metallurgy, and a professor of analytical and agricultural chemistry, besides certain assistants.

In 1846, the project of a Scientific School, to be connected with Harvard University, was first publicly announced, and the plans laid before Hon. Abbott Lawrence of Boston, a distinguished merchant of wealth and public spirit. In June, 1847, he offered to the college the munificent sum of \$50,000, "for the purpose of teaching the practical sciences." This gift was to be applied for the erection of suitable buildings, and the purchase of apparatus, the residue to form a fund for the support of professors.

On this foundation the school was commenced the same year; Professor Horsford, already connected with the university, filling the chair of chemistry; Professor Agassiz, of Switzerland, being called to that of zoölogy and geology, and Lieut. Eustis, of the army, to that of engineering. In 1849, a laboratory, then unsurpassed even in Europe in its conveniences for practical instruction, was erected and furnished; and in 1850 a building was constructed for the temporary accom-

modation of the departments of zoölogy, geology, and engineering. Besides the professors already mentioned, instruction is given by the college professors in mathematics, physics, botany, comparative anatomy and physiology, and mineralogy. The school is essentially a combination of independent departments, each having exclusive control of its own internal arrangements, and sustaining a complete course of instruction for itself. At the death of Mr. Lawrence, August 18, 1855, the school received by bequest, as a second gift, the sum of \$50,000, to increase its facilities for instruction and research. Connection with the school for at least a single year, in attendance on the prescribed course of studies, in one or more departments, and a satisfactory public examination, are essential to taking the degree of Bachelor of Science.

An estate valued at \$350,000 was bequeathed to Harvard College in 1842 by Mr. Benjamin Bussey, of Roxbury, Mass. (to be received after the death of certain relatives), one half of which, including his mansion and farm, was to be appropriated to the establishment of an agricultural school under the direction of the college.

The Chandler Scientific School, connected with Dartmouth College, at Hanover, N. H., was established in 1851, in acceptance of a gift of \$50,000, bequeathed to the trustees, for this purpose, by Abiel Chandler. He was a wealthy merchant of Boston, Mass., who was born in 1778 in Concord, N. H., and died in Walpole, N. H., March 22d, 1851. By the will of the founder, instruction is to be given in "mechanics and civil engineering, the invention and manufacture of machinery, carpentry, masonry, architecture, and drawing, the investigation of properties and uses of materials employed in the arts, the modern languages, and English literature, together with bookkeeping." The school was opened in 1852, and the course of study occupies four years; for the general course in the fourth year, may be substituted a civil engineering course or a commercial course.

Those completing the regular course of four years, and passing a satisfactory examination, are entitled to the degree of Bachelor of Science.

Resident graduates will be instructed in the following advanced subjects, through an additional course of one or two years: Analytical chemistry, analytical and celestial

mechanics, application of mechanics to carpentry and masonry, mechanical agents, geodesy, practical astronomy, the arts of design with reference to the useful arts.

The demand for instruction in chemistry beyond the requirements of the general college course, has led to a modification of the requirements of many of our colleges and universities. Among the schools included in the University of Virginia, is one of chemistry, in which department a systematic course of practical instruction is given in qualitative and quantitative analysis. The laboratory is open, and an instructor gives his personal attention to the students therein, for eight hours daily, five days in the week.

CHAPTER XIII.

SCHOOLS OF AGRICULTURE.

THE first plan of an agricultural school or college in the English language, which we have met with, was published in 1651 by "Master Samuel Hartlib," to whom Milton addressed his *Tractate on Education*, and to whom the Parliament of England gave a pension for his disinterested efforts to advance the agricultural and educational interests of the commonwealth. It was nearly two hundred years before an institution of this character was established by individual enterprise, without the aid of any public grant, in the British dominions.

The Agricultural College of the State of Michigan was established in 1855, in accordance with a provision of the revised constitution of the state, adopted in 1850. The legislature in 1855, and again in 1857, provided for the purchase of land and the endowment and management of the institution. A tract of 676 acres, lying three and a half miles east from Lansing, the state capital, was purchased, and a building with accommodations for 80 pupils was erected and dedicated May 13th, 1857. The faculty includes a president, and professors of mathematics, chemistry, physiology and entomology, natural science, English literature, and farm economy and horticulture. The tuition is free (except a matriculation fee of \$5), and the students are required to labor three hours a day on the farm, for which they receive a compensation which is allowed in payment of board. The course of professional instruction embraces two years,

and includes—I. Theory and Practice of Agriculture—II. Agricultural Chemistry—III. Civil and Rural Engineering—IV. Botany and Vegetable Physiology—V. Zoölogy and Animal Physiology. There is a preparatory course of one year, designed for candidates who have not pursued elsewhere the preliminary studies required in English language, geography and arithmetic, for entrance.

The State University of Michigan at Ann Arbor provides a scientific course, occupying four years, and embracing mathematics, astronomy, geology, zoölogy, botany, chemistry, mineralogy, philosophy, rhetoric, history and modern languages. The School of Engineering, connected with the institution, receives students who have completed the second and third years of the scientific course, and devotes two years to their instruction in engineering. The only charge to the student, from whatever part of the country he may come, is an admission fee of ten dollars.

The Maryland Agricultural College was established and endowed by the state legislature in 1856. The college farm is about two and a half miles north of Bladensburg, in Prince George's county. The faculty includes a president, and five professors, viz.: one of the science of agriculture, including chemistry, geology, etc.; one of the exact sciences, one of languages, one of philosophy, history, etc., and one of natural history, botany, etc. The student, in connection with his course, is obliged to labor on the farm.

The agricultural college now established near Ovid, Seneca Co., N. Y., took its rise from plans started as early as 1837. Nothing definite was accomplished until, in 1844, a charter for an agricultural college was obtained from the legislature; after further delays, in 1856, the sum of \$40,000 was appropriated to the college by the legislature, on condition that a like sum be raised by private subscription. This was speedily accomplished, and a tract of some 400 acres purchased. Preparation is making for the accommodation of a large number of pupils.

The Farmers' High School of Pennsylvania was founded by the agricultural society of the state, with a fund of \$10,000, accumulated from its annual exhibitions up to the autumn of 1854. The legislature passed an act of incorporation, and a board of trustees was organized; after various private

subscriptions, the legislature appropriated in 1858 the sum of \$50,000 to the school, part of which sum being dependent on the raising of a like amount by individual contribution. In 1856, the suitable farm-buildings were erected on lands given to the school.

CHAPTER XIV.

COMMERCIAL SCHOOLS.

"Commercial schools," which supply an education adapted to future business life, and to make up in some measure for previous deficiencies in the studies of youths early devoted to trade, are a class of schools of quite recent date; none of them, it is believed, being of a greater age than fifteen or twenty years. They are naturally established in the larger and busier mercantile cities, and their course of study, of course a comparatively brief and confined one, usually includes but little if any of classics and literature, consisting principally of writing, book-keeping, commercial arithmetic, business proceedings, and sometimes mercantile law. Their existence seems to indicate a deficiency in their department, in the higher public schools, although those schools could not afford a similar course of equal extent and thoroughness. But there is no doubt that a competent course of studies preparatory to commercial life, should form part of the course of the high schools of our cities and large business towns.

CHAPTER XV.

SCHOOLS FOR MECHANICS.

DURING nearly half a century, many indications may be traced of a more or less distinct feeling of the need of some systematic instruction in mechanic arts, although this feeling has not been so extensive and decided as to result in any permanent institutional provision for the purpose.

The Lyceum movement, in which Josiah Holbrook was so active a laborer, commencing about 1823, was accompanied by the institution of many courses of lectures and classes upon subjects connected with mechanics and trades. The Mechanics' School of New York City, an institution still exist-

ing, was originally intended to afford instruction, among other things, in mechanical processes and the application of mechanical principles.

A movement was made in the legislature of Massachusetts, in 1825, for the establishment of a state institution for the professional training of youth intending to follow "mercantile, manufacturing, and mechanical pursuits." Though advocated with some earnestness during several sessions, this plan never reached a practical development.

The "manual labor schools," of which a considerable number were established a few years later, frequently provided for the practice of some mechanical trade, usually carpentry. Such was the case at Lane Seminary and at the Oneida Institute, both founded in 1829, and elsewhere.

Somewhat more extensive was the plan of the Franklin Institute of Philadelphia, which established in 1826 a high school, of which it was a special object to "afford the industrial classes cheap instruction in sciences and arts." This institution flourished under the energetic management of Professor W. R. Johnson, and until superseded by the introduction of the present school system of Philadelphia, with its high school, which has not, however, retained this practical department.

Brief courses of lectures, to apprentices, or to mechanics, were organized at various points, as a consequence of the Lyceum movement. Where these have been maintained as an annual institution, however, their distinctive, practically useful character has invariably disappeared in the merely amusing dissipation which is the only object of the present "lecture system."

There exist at present in Philadelphia and Brooklyn schools known as "Polytechnic Schools;" but this name seems to have been chosen as well adapted to catch the ear, rather than as descriptive of any thing peculiar in their course of study.

Some provision for systematic instruction in the mechanic arts, of a higher grade than the pure realism of the shop, is certainly needed. Departments of this character attached to the higher public schools of our larger towns would unquestionably serve a very useful purpose, and would command a certain number of pupils. At the same time it must be confessed that this number would not immediately be great; a fact readily accounted for by the two considera-

tions, that the peculiar conditions of life in the United States strongly disincline the young to apply themselves long or closely to the acquirement of a finished mastery of any occupation, and that it would be extremely difficult to supply instructors qualified to explain and teach the actual practical application to wood, stone, metal, and other materials, of true scientific principles in the most economical way.

CHAPTER XVI.

FINE ARTS.

IN modern civilization, culture in fine arts (music, painting, sculpture, architecture) is the attribute and privilege of an advanced stage of social organization. The people of the United States, hitherto intensely occupied in subduing a new country, and in a vigorous and prosperous pursuit of material wealth, have at the present day but just begun those vast accretions of capital, which must form the basis of any culture in fine arts worthy of the name. To none of these arts has great attention been given, and for teaching them nothing like a general public provision has been made.

During the last thirty years, the practice has slowly gained ground among the public schools, both in city and country, of affording the pupils some instruction and training in the rudiments of singing. In a far smaller number of schools, similar rudimentary instruction has been given in drawing; and in one or two secondary schools of the higher city class, pupils have been afforded the means of pursuing that study further, by means of collections of casts and models.

Generally speaking, however, the aspirant after a profound or even competent knowledge of any fine art, has been left to acquire it either by his own unassisted and solitary labor, by the aid of some older practitioner, or by study in foreign schools of art.

The progress of the study of music in our schools, is coincident with the career of the distinguished teacher, Lowell Mason, who was the first to introduce into the school system an efficient mode of teaching singing, about 1830. Of musical schools exclusively, it is believed that there have not been more than two, both of which are in Connecticut. Private schools for girls usually afford their pupils more or less training in executing

music upon the piano-forte, but without communicating any scientific knowledge of music.

Within a recent period, several schools have been opened in a few of the larger cities, for instruction in drawing; always having the practical side most prominent, and leading their pupils as rapidly as possible toward the production of salable designs for manufacturing purposes, or of wood engravings for the use of publishers. A superficial practice in drawing, usually by the senseless method of exclusively copying other drawings or engravings, is commonly afforded at private schools for girls. Some small advantages for those desiring more advanced acquirements, are afforded by the various public galleries and collections accessible in some large cities. The painter or sculptor, as well as the architect, must however learn his art from such sources as his individual opportunities allow him to command.

CHAPTER XVII.

FEMALE EDUCATION.

THE education of girls is of course not properly a special department any more than that of boys. Still, the history and the present condition of this department of education present many facts which will sufficiently justify its separate treatment, aside from the intrinsic differences which must also characterize it.

Until a comparatively recent period, but trifling provision was made for the education of girls. Down to the close of the Revolution, although girls might attend the public schools, but a small share of time or labor was devoted to them; and their attention was supposed to be more suitably directed to needle-work and housewifery than to intellectual training.

The first school of eminence exclusively for girls was the Moravian Seminary at Bethlehem, Pennsylvania. This was established as early as 1749, but was not opened as a boarding-school until 1785. It enjoyed a national reputation; and its catalogue includes such names as Lansing, Livingston, Bayard, Sumter, and many others from the whole range of states. It was never more flourishing than in 1860.

It has been claimed that President Dwight, in his school at Greenfield, opened in 1783,

was the first in the country to admit pupils of both sexes to an entire equality of intellectual training. In any event, both this school and his previous one at Northampton afforded to both boys and girls an education of uncommon value for the period.

When that famous teacher, Caleb Bingham, removed to Boston, in 1784, he did so with the design of opening there a school for girls, who were, singularly enough, at that time excluded from the public schools. Mr. Bingham's enterprise was successful, and was also the means of revolutionizing the unfair school system of the city, and of introducing a plan which, though variously imperfect, at least provided some public instruction for girls.

In 1792, Miss Pierce opened a school for girls at Litchfield, Connecticut, which continued in operation for forty years, and educated large numbers of young ladies from all parts of the country. In the same year, at Philadelphia, was incorporated one of the first, if not the first, female academies in this country.

From about 1797 to 1800, Rev. William Woodbridge, father of the well-known author and educator W. C. Woodbridge, taught a young ladies' school, at first at Norwich, and afterward at Middletown, Conn.

In 1816, Mrs. Emma Willard commenced her endeavors to secure for women the opportunity of acquiring a grade of education corresponding to that which colleges furnish to the other sex. The eminent success and excellence of her celebrated school at Troy are well known; and an important consequence of her labors was, that female seminaries were admitted to receive aid from the literature fund of the state of New York, on the same terms with the academies.

From 1818 to 1830, Rev. Joseph Emerson conducted a young ladies' school of high reputation and efficiency, successively at Byfield and Saugus, Mass., and Wethersfield, Conn. In 1823, George B. Emerson, Esq., opened a young ladies' school at Boston, probably with a more complete and efficient outfit and apparatus than any which had preceded it.

The well-known school of John Kingsbury, Esq., an institution of similar grade and excellence, was opened at Providence, R. I., in 1828.

In 1822, Miss Catherine E. Beecher opened a school for young ladies at Hartford, Conn., which she conducted with eminent success for ten years. She afterward taught for a short period at Cincinnati, but her la-

bors for female education have subsequently consisted in various publications, and in the management of an extended scheme for a system of Christian female education, including a national board, high schools, and normal schools; which has resulted in the establishment of several valuable institutions.

In 1825, at Wilbraham, Mass., was opened the first of the Methodist Conference seminaries; institutions whose plan has substantially followed that of the Wilbraham Seminary, which was drawn up by Rev. Wilbur Fiske, its first principal.

Miss Z. P. Grant and Miss Mary Lyon, both pupils of Rev. Joseph Emerson, were associated in the conduct of an excellent school for young ladies at Ipswich, Mass. The energetic and persevering labors of Miss Lyon, with the purpose of establishing a permanent Protestant school of high grade for young ladies, resulted in the establishment of the celebrated seminary at South Hadley, which was opened in 1837.

The present era in the history of female education in the United States is perhaps most strikingly characterized by the number of large and largely endowed institutions of a high grade, which have been established in various parts of the country. One of them is the Mount Holyoke Female Seminary, at South Hadley, just mentioned. The Packer Collegiate Institute at Brooklyn, N. Y., another of them, had previously existed as the Brooklyn Institute; and received its present name in consequence of the munificent gift of \$85,000 by Mrs. Harriet L. Packer of that city. The whole property represents a value of \$150,000. A still more magnificent endowment is that of the Vassar Female College at Poughkeepsie, N. Y., for which the vast sum of \$408,000 has been given by Matthew Vassar, Esq., of that city.

A characteristic of the female education of the present period is the practice of admitting pupils of both sexes to institutions for secondary and superior education; to the high schools of cities, to academies, to the normal schools, and even in one or two institutions of the collegiate grade. Another one is the increasing regard which is paid to the employment of female teachers, and to their thorough preparatory training for that duty, in institutions partly or wholly for that purpose. On the whole, the department of female education is, at present, attracting as much attention, and improving as rapidly, as any other.

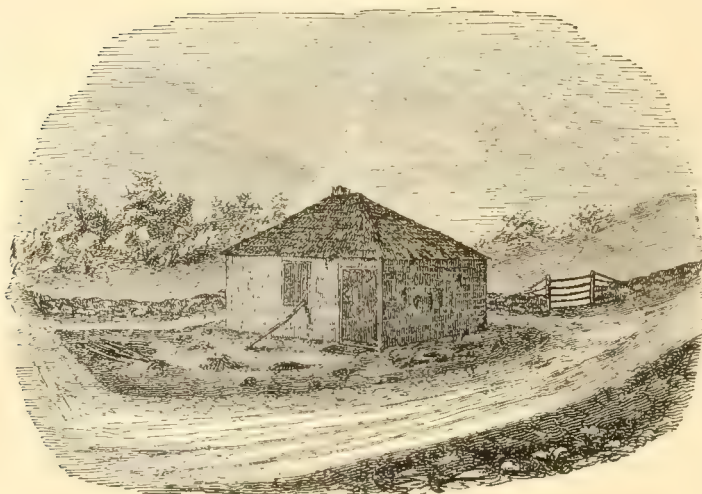
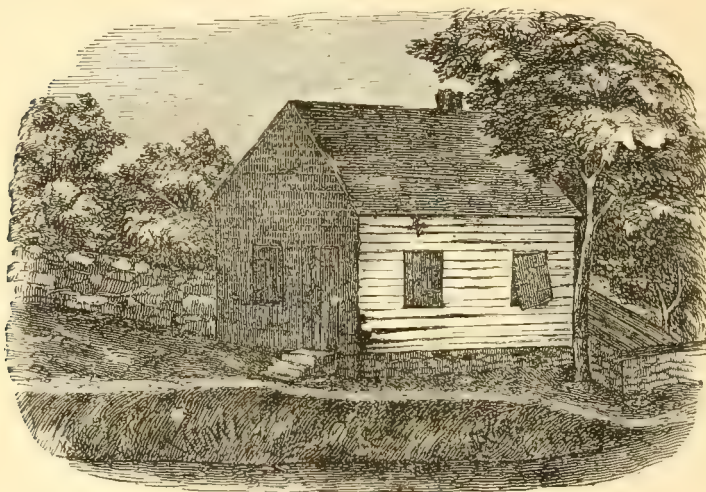
CHAPTER XVIII.

SCHOOL-HOUSES, APPARATUS, AND TEXT-BOOKS.

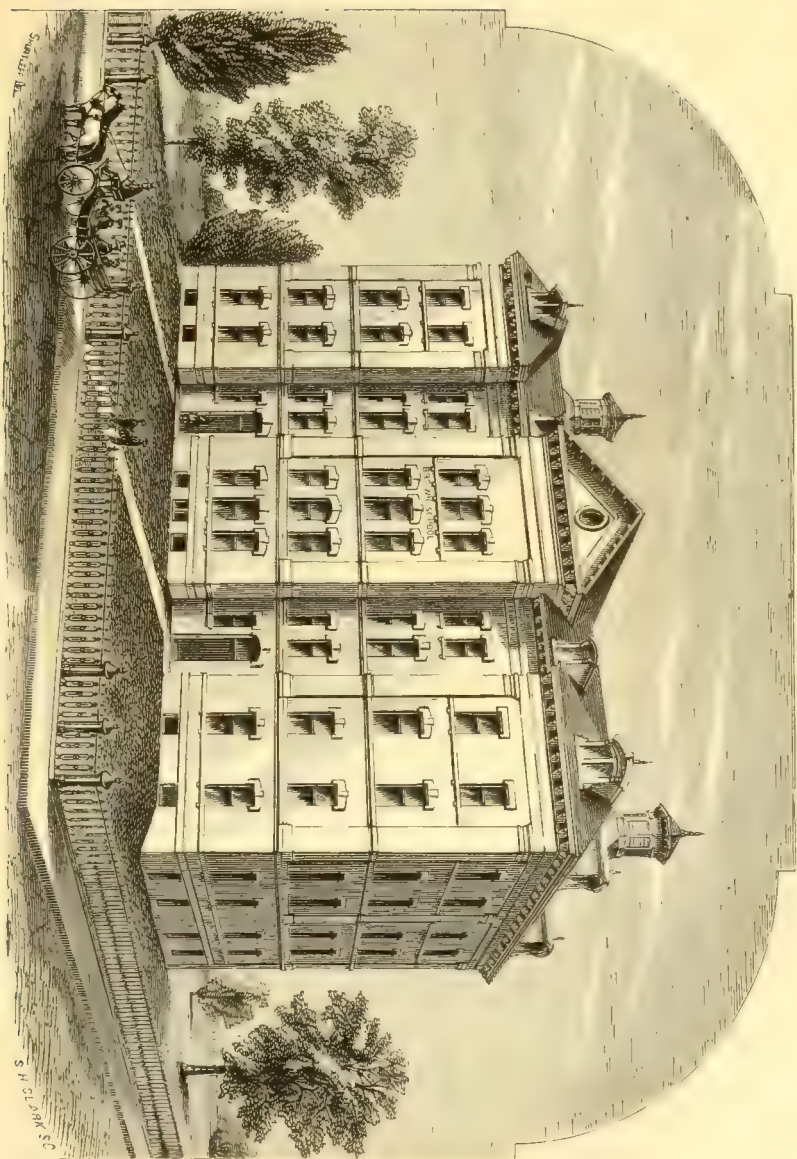
IN no department of instruction has the work of improvement been so general, so rapid, or so thorough as in the material outfit of the school. Within a quarter of

a century a revolution has been wrought in public opinion and action in respect to the location, construction, ventilation, warming, furniture, and equipment generally, of school-houses, and more than thirty-five millions of dollars have been expended for these objects within this short period.

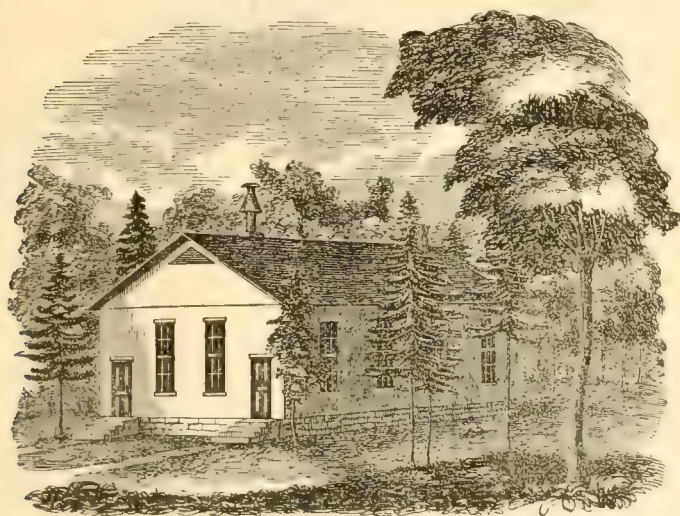
SCHOOL-HOUSES AS THEY WERE.



BROWN SCHOOL, HARTFORD, CONN.



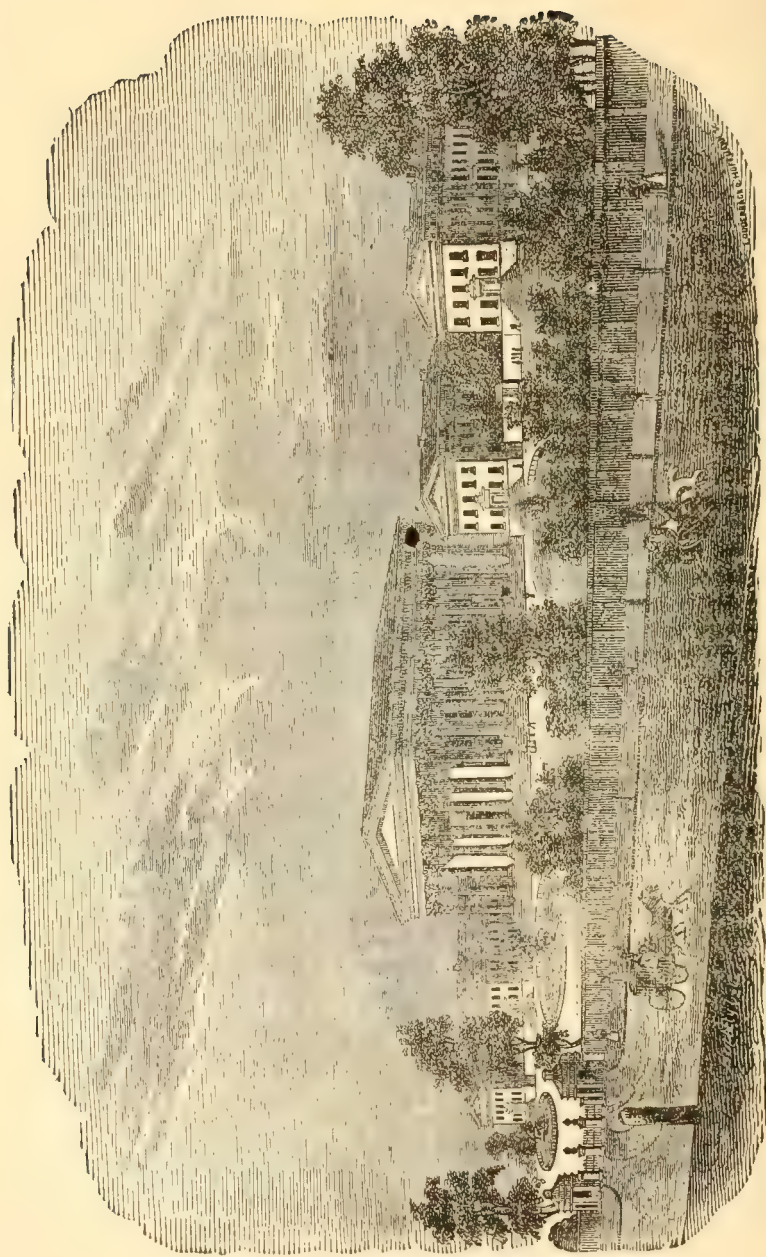
SCHOOL-HOUSES AS THEY ARE.



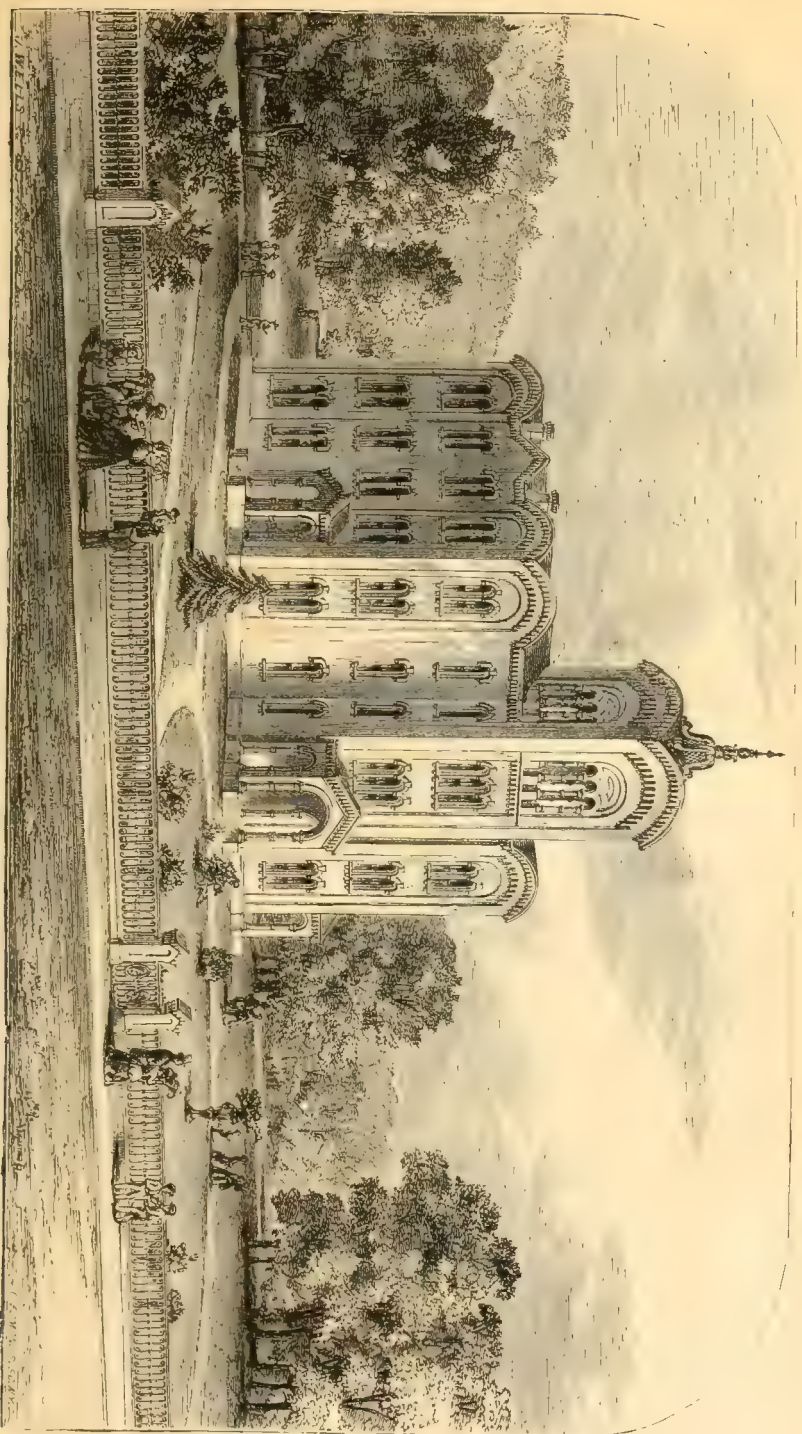
COUNTRY DISTRICT SCHOOL-HOUSE.



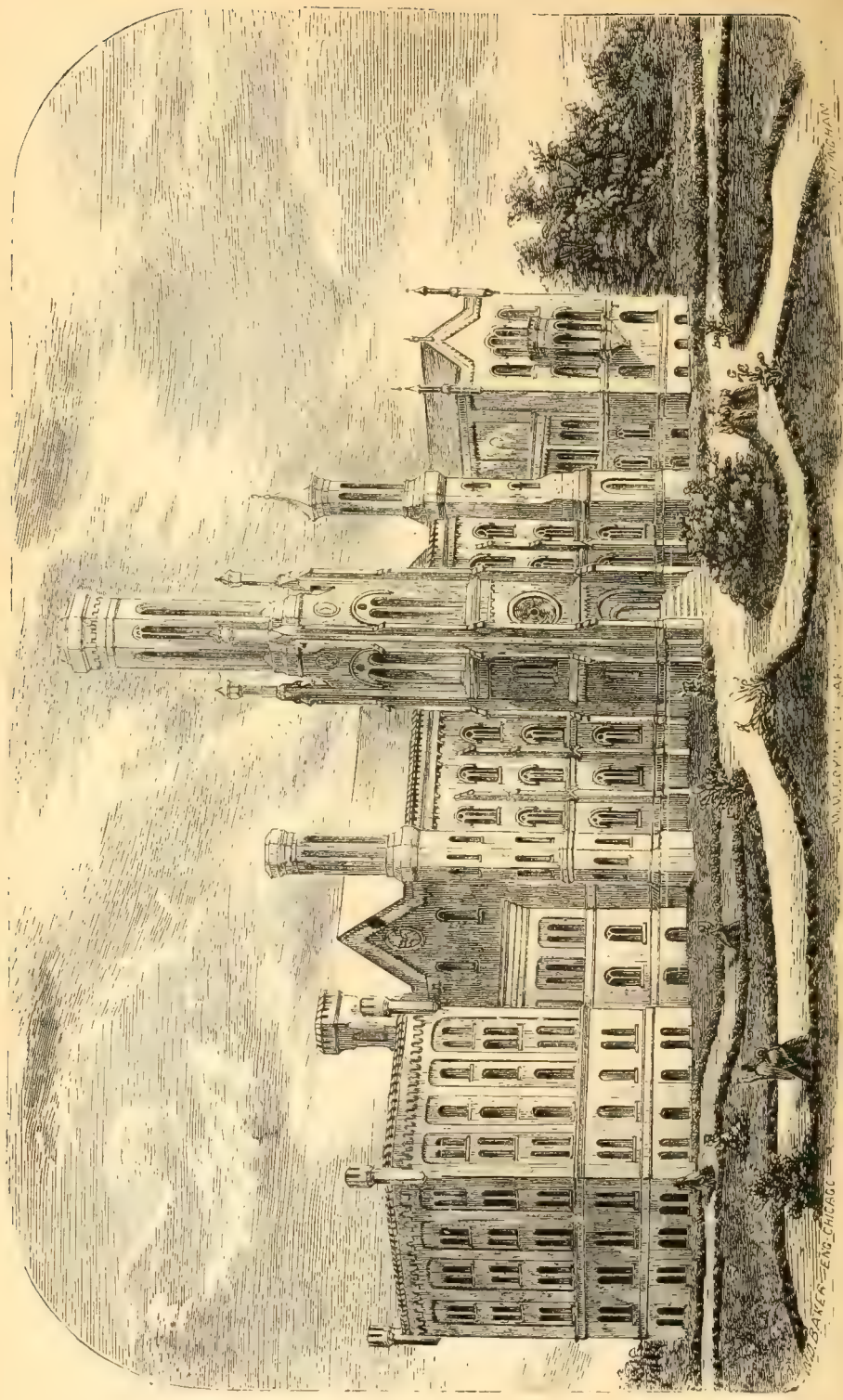
VILLAGE SCHOOL-HOUSE.



VIEW OF GIRARD COLLEGE.

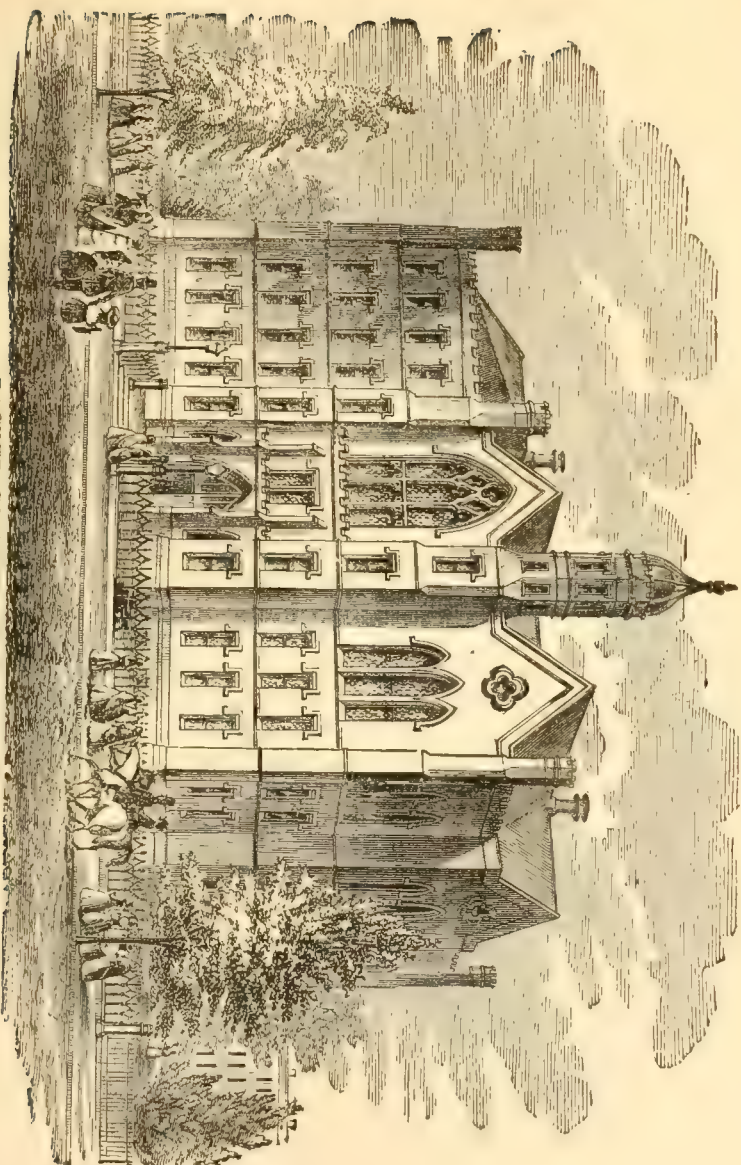


NORWICH (CONN) FREE ACADEMY.



CHICAGO CITY UNIVERSITY.

W. B. BAKER - ENG. CHICAGO



PACKER COLLEGIATE INSTITUTE

PACKER FEMALE COLLEGIATE INSTITUTE.

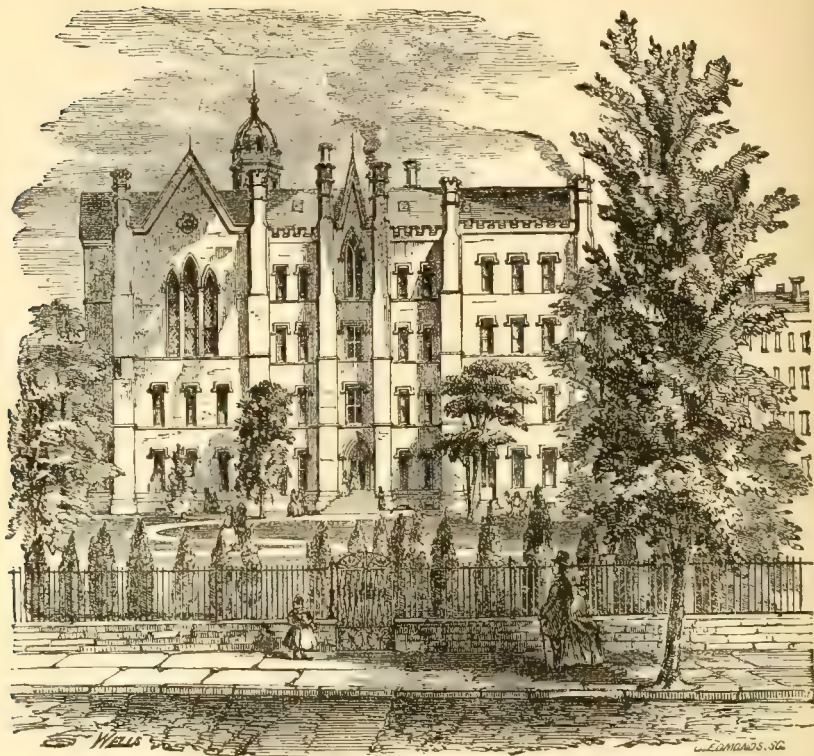


Fig. 2. GARDEN FRONT.



Fig. 3. INTERIOR OF CHAPEL.

SCHOOL-BOOKS.

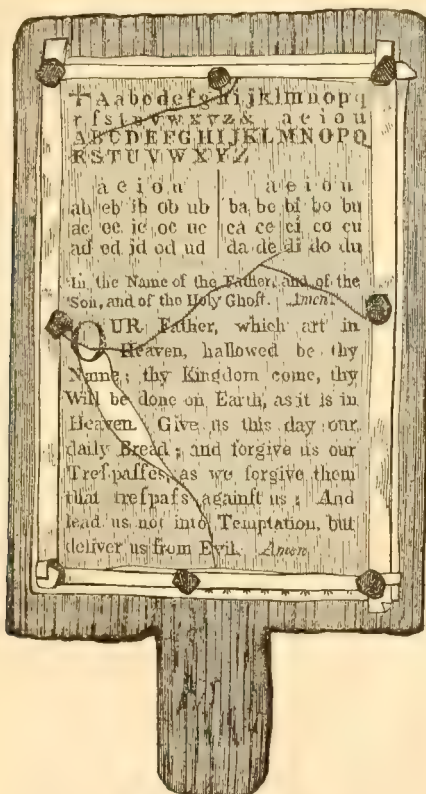
The improvement in the authorship and manufacture of text-books, from the Primer to the Manuals of our colleges and scientific schools, within the last half century is immense. We will refresh the memory of some of our readers by reproducing a few of the tough subjects and illustrations with which they or their fathers were painfully familiar.

The Horn-book.

Few of us have had the satisfaction of learning our letters after the manner described by Prior:—

"To master John the English maid
A Horn-book gives of gingerbread;
And that the child may learn the better,
As he can name, he eats the letter."

To many, even a picture of the old-fashioned Horn-book—the Primer of our ancestors, consisting of a single leaf pasted on a board, and covered in some instances with thin



HORN-BOOK OF THE EIGHTEENTH CENTURY.

transparent horn to preserve it from being torn or soiled—will be new. The following description and the accompanying cut we copy from Barnard's *American Journal of Education*, for March, 1860:—

Shenstone, who was taught to read at a dame school near Halesowen, in Shropshire, in

his delightfully quaint poem of the *Schoolmistress*, commemorating his venerable preceptress, thus records the use of the Horn-book:—

“Lo! now with state she utters her command;
Eftsoons the urchins to their tasks repair;
Their books of stature small they take in hand,
Which with pellucid horn secured are
To save from finger wet the letters fair.”

Cowper thus describes the Horn-book of his time:—

“Neatly secured from being soiled or torn
Beneath a pane of thin translucent horn,
A book (to please us at a tender age
'Tis called a book, though but a single page),
Presents the prayer the Saviour deigned to teach,
Which children use, and parsons—when they preach.”

Tirocinium, or a Review of Schools, 1784.

In “*Specimens of West Country Dialect*,” the use of the Horn-book is thus shown:—

“Commether *Billy Chubb*, an breng the hornen book. Gee ma the vester in tha windor, yor *Pal* came!—What! be a sleepid—I’ll wäke ye. Now, *Billy*, there’s a good bway! Ston still there, and mind what I da zä to ye, an whaur I da point. Now; criss-cross, girt ä, little a—b—c—d. That’s right, *Billy*; you’ll zoon lorn the criss-cross-lain; you’ll zoon auvergit Bobby Jiffry—you’ll zoon be a *scholard*. A’s a pirty chubby bway—Lord lov’n!”

New England Primer.

Of the New England Primer we can give no earlier specimen than the edition of 1777, embellished with a portrait of John Hancock, Esq., who was at that time President of the Continental Congress.

We must not omit the painfully interesting group of John Rogers in the burning faggots, with his wife and nine or ten children—including the one at the breast—a problem which has puzzled many a school-boy’s brain:



The Honorable JOHN HANCOCK, Esq;
President of the American Congress.



MR. JOHN ROGERS, minister of the gospel in London, was the first martyr in Queen MARY’S reign, and was burnt at Smithfield, February 14, 1554.—His wife with nine small children, and one at her breast following him to the stake; with which sorrowful sight he was not in the least daunted, but with wonderful patience died courageously for the gospel of JESUS CHRIST.

We are fortunate in being able to present our readers with an exact transcript of the our pages of the first illustrated alphabet printed in this country. Some of our readers may recognize their old friends of the later editions of the Primer, in which "Young Timothy" and "Zaccheus he" were drawn to nature less severely true. The whole belongs to that department of literature which "he who runs may read, and he who reads will run."



I N A D A M's Fall
We finned all.



B Heaven to find,
The Bible Mind.



C H R I S T crucify'd
For finners dy'd.



T H E Deluge drown'd
The Earth around.



E L I J A H hid
By Ravens fed.



T H E judgment made
F E L I X afraid.



N O A H did view
The old world & new



C Y O U N G O B A D I A S,
D A V I D, J O S I A S
Ail were pious.



P E T E R deny'd
His Lord and cry'd.



Q U E E N E S T H E R fues
And faves the *Jews*.



R U T H pious
Left ail for Truth.



S A M' L dear
The Lord did fear.



G A S runs the Glass,
Our Life doth pass.



H M Y Book and Heart
Must never part.



J O B feels the Rod,—
Yet blefles GOD.



K O R A H's troop
Was fwallowed up



L O T fled to Zoar,
Saw fiery Shower
On Sodom pour.



M O S E S was he
Who *Israel's* Host
Led thro' the Sea.



T Y O U N G T I M O T H Y
Learnt fin to fly.



U A S T H I for Pride,
Was fet aside.



W H A L E S in the Sea,
G O D's Voice obey.



X E R X E S did die,
And fo must I.



Y W H I L E youth do chear
Death may be near.



Z A C C H E U S he
Did climb the Tree
Our Lord to fee.

WEBSTER'S SPELLING BOOK.

FEW books have done more to give uniformity to the orthography of the language or to fill the memory of successive generations with wholesome truths than Webster's Spelling Book. Who can forget his first introduction to those four-and-twenty characters, standing in stiff upright columns, in their roman and italic dress, beginning with little *a*, and ending with that nondescript "*and per se*," or his first lesson in combining letters,

ba be bi bo bu by

Or his joy in reaching words of two syllables,

ba ker bri er ci der

Or his exultation in learning to "know his duty" in those "Lessons of Easy Words" beginning,

No man may put off the law of God :

Or the more advanced steps, both in length of words and stubborn morality, in pursuit of

The wick-ed flee

And closing his spelling career with

Om pom pa noo suc
Mich il li mack a nack

And

Ail to be troubled
Ale malt liquor

In this hasty glance at this famous text book, we have designedly passed over the fables commencing with the Rude Boy and ending with Poor Tray, that we might introduce them all unabridged with their unique illustrations.

Of the Boy that stole Apples.



AN old man found a rude boy upon one of his trees stealing Apples, and defired him to come down; but the young Sauce-box told him plainly he would not. Won't you? said the old Man, then I will fetch you down; so he pulled up some tufts of Grass, and threw at him; but this only made the Youngster laugh, to think the old Man should pretend to beat him down from the tree with grass only.

Well, well, said the old Man, if neither words nor grass will do, I must try what virtue there is in Stones; so the old Man pelted him heartily with stones;

which soon made the young Chap hasten down from the tree and beg the old Man's pardon.

MORAL.

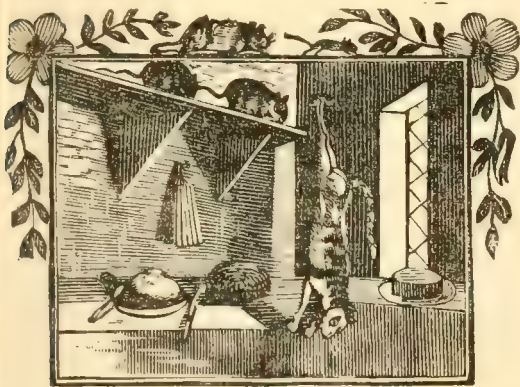
If good words and gentle means will not reclaim the wicked, they must be dealt with in a more severe manner.

The Country Maid and her Milk Pail.

WHEN men suffer their imagination to amuse them, with the prospect of distant and uncertain improvements of their condition, they frequently sustain real losses, by their inattention to those affairs in which they are immediately concerned.

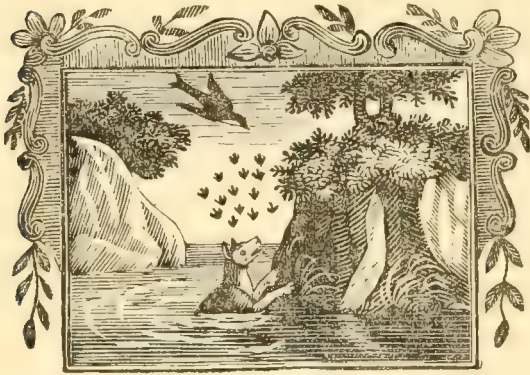
A country Maid was walking very deliberately with a pail of milk upon her head, when she fell into the following train of reflections: The money for which I shall sell this milk will enable me to increase my stock of eggs to three hundred. These eggs, allowing for what may prove addle, and what may be destroyed by vermin, will produce at least two hundred and fifty chickens. The

chickens will be fit to carry to market about Christmas, when poultry always bears a good price; so that by May Day I cannot fail of having money enough to purchase a new Gown. Green—let me consider—yes, green becomes my complexion best, and green it shall be. In this dress I will go to the fair, where all the young fellows will strive to have me for a partner; but I shall perhaps refuse every one of them, and with an air of disdain, toss from them. Transported with this triumphant thought, she could not forbear acting with her head what thus passed in her imagination, when down came the pail of milk, and with it all her imaginary happiness.

The Cat and the Rat.

A CERTAIN Cat had made such unmerciful havoc among the vermin of her neighbourhood, that not a single Rat or Mouse ventured to appear abroad. Puss was soon convinced, that if affairs remained in their present situation, she must be totally unsupplied with provisions. After mature deliberation, therefore, she resolved to have recourse to stratagem. For this purpose she suspended herself to a hook with her head downwards, pretending to be dead. The Rats and Mice, as they peeped from their holes, observing her in this dangling attitude, concluded she was hanging for some misdemeanour; and

with great joy immediately sallied forth in quest of their prey. Puss, as soon as a sufficient number were collected together, quitting her hold, dropped into the midst of them; and very few had the fortune to make good their retreat. This artifice having succeeded so well, she was encouraged to try the event of a second. Accordingly she whitened her coat all over, by rolling herself in a heap of flour, and in this disguise lay concealed in the bottom of a meal tub. This stratagem was executed in general with the same effect as the former. But an old experienced Rat, altogether as cunning as his adversary, was not so easily ensnared. I don't much like, said he, that white heap yonder: Something whispers me there is mischief concealed under it. 'Tis true it may be meal; but it may likewise be something that I should not relish quite so well. There can be no harm at least in keeping at a proper distance; for caution, I am sure, is the parent of safety.

The Fox and the Swallow.

ARISTOTLE informs us, that the following Fable was spoken by Eſop to the Samians, on a debate upon changing their miniſters, who were accuſed of plundering the commonwealth.

A Fox ſwimming acroſs a river, happened to be entangled in ſome weeds that grew near the bank, from which he was unable to extricate himſelf. As he lay thus expoſed to whole ſwarms of flies, which were galling him and ſucking his blood, a ſwallow, obſerving his diſtreſs, kindly offered to drive them away. By no means, ſaid the Fox; for if theſe ſhould be chafed away, which are already ſufficiently

gorged, another more hungry ſwarm would ſucceed, and I ſhould be robbed of every remaining drop of blood in my veins.

The Fox and the Bramble.

A FOX, cloſely purſued by a pack of Dogs, took ſhelter under the covert of a Bramble. He rejoiced in this aſylum; and for a while, was very happy; but ſoon found that if he attempted to ſtir, he was wounded by thorns and prickles on every ſide. However, making a virtue of neceſſity, he forbore to complain; and comforted himſelf with reflecting that no bliſs is perfect; that good and evil are mixed, and flow from the ſame fountain. Theſe Briers, indeed, ſaid he, will tear my ſkin a little, yet they keep off the dogs. For the ſake of the good then let me bear the evil with patience;

each bitter has its ſweet; and theſe Brambles, though they wound my fleſh, preſerve my life from danger.

The Partial Judge.

A FARMER came to a neighbouring Lawyer, expreſſing great concern for an accident which he ſaid had juſt happened. One of your Oxen, continued he, has been gored by an unlucky Bull of mine, and I ſhould be glad to know how I am to make you reparation. Thou art a very honeſt fellow, replied the lawyer, and wilt not think it unreaſonable that I expect one of thy Oxen in return. It is no more than juſtice, quoth the Farmer, to be ſure; but what did I ſay? —I miſtake—It is *your* Bull that has killed one of *my* Oxen. Indeed! ſays the Lawyer, that alters the caſe; I

must inquire into the affair; and if—And *if*! said the Farmer—the business I find would have been concluded without an *if*, had you been as ready to do justice to others, as to exact it from them.

The Bear and the two Friends.



TWO Friends, setting out together upon a journey, which led through a dangerous forest, mutually promised to assist each other if they should happen to be assaulted. They had not proceeded far, before they perceived a Bear making towards them with great rage.

There were no hopes in flight; but one of them, being very active, sprang up into a tree; upon which the other, throwing himself flat on the ground, held his breath and pretended to be dead; remembering to have heard it asserted, that this creature will not prey upon a dead carcass. The bear came up, and after smelling to him some time, left him and went on. When he was fairly out of sight and hearing, the hero from the tree called out—Well, my friend, what said the bear? he seemed to whisper you very closely. He did so, replied the other, and gave me this good piece of advice, never to associate with a wretch, who in the hour of danger, will desert his friend.

The Two Dogs.



HASTY and inconsiderate connections are generally attended with great disadvantages; and much of every man's good or ill fortune, depends upon the choice he makes of his friends.

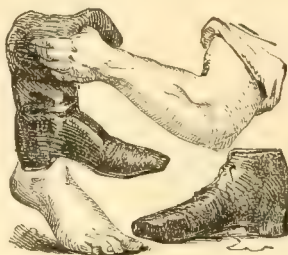
A good-natured Spaniel overtook a furlly Maltiff, as he was travelling upon the high road. Tray, although an entire stranger to Tiger, very civilly accosted him; and if it would be no interruption, he said, he should be glad to bear him company on his way. Tiger, who happened not to be altogether in so growling a mood as usual, accepted the proposal; and they very amicably pursued their journey together. In the midst of their conversation, they arrived at the next village, where Tiger began to display his malignant disposition, by an unprovoked attack upon every dog he met. The villagers immediately sallied forth with great indignation, to rescue their respective favourites; and falling upon our two friends, without distinction or mercy, poor Tray was most cruelly treated, for no other reason, but his being found in bad company.

The following cuts, sketched from WILLSON'S Series of "School and Family Readers," with the accompanying explanations, show the great degree of advancement made, not only in the artistic beauty of the Illustrations contained in the latest published of our Reading-Books, but, more especially, in the successful attempt to combine *instruction in reading with advancement in useful knowledge.*

From the First Reader.



Eye, Nose, Ear, Mouth, Face.



Arm, Hand, Boot, Foot, Shoe.



The Eagle's Nest.

The leading principle developed in the **SECOND READER** (but which also runs throughout the entire Series) is the early cultivation of the *Perceptive Faculties* by lessons drawn from a great variety of objects and scenes which are represented to the eye of the pupil.

The **THIRD READER** of the Series, after a brief synopsis of the "Elements of Elocution," is divided into Four Parts:—

PART I., "Stories from the Bible," beautifully and bountifully illustrated.—PART II., "Moral Lessons." Part II., "First Division of Animal Life," embracing the Mammalia; and PART IV., "Miscellaneous." The following four illustrations give the pupil a general idea of the four great divisions of the Animal Kingdom.



I. VERTÉBRATES.



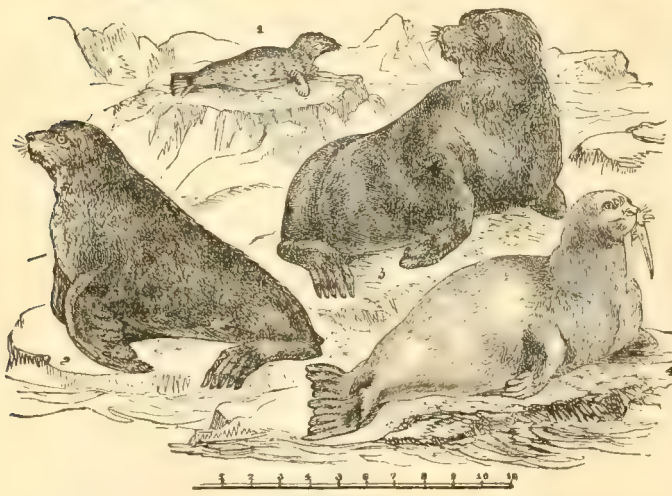
II. ARTHROPODS.



III. MOLLUSCS.



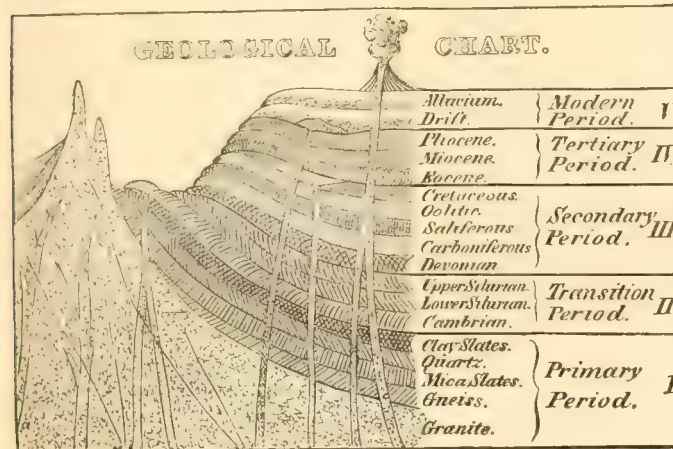
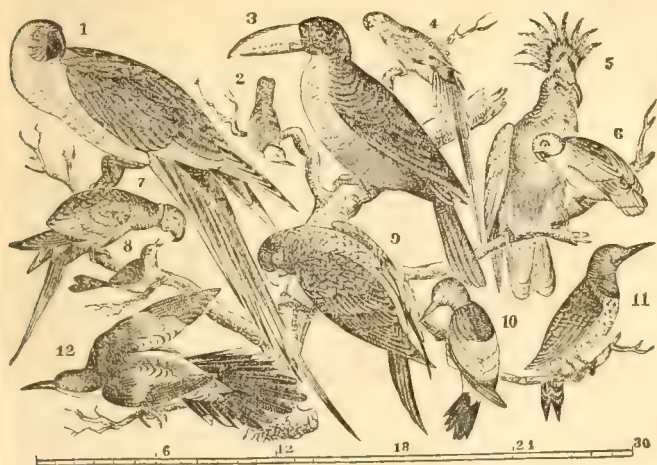
IV. RADIATES.



ANIMALS OF THE SEAL KIND.—1. Common Seal, *Phoca vitulina*. 2. Sea-Bear, *Phoca ursina*. 3. Sea-Lion, *Phoca jubata*. 4. Walrus, or Sea-Horse, *Trichechus rosomarus*.

The subject of the *Mammalia*, in the **THIRD READER**, is illustrated by more than two hundred figures of Animals, many of them in groups, with *Scales of Accoustment* showing their comparative sizes, as in the Animals of the Seal kind in the annexed engraving. This we believe to be a new feature, even in zoological works, and it is one that is eminently useful.

An attempt has been made—and, it is believed, successfully—to invest the subject of animal life with a great degree of interest for children; to promulgate it to their capacities; to give all didactic variety to the lessons, as exercised in reading; and to convey as much positive information as would be compatible with the requirements for a good Reading-Book. Numerous interesting incidents of animal life, illustrating traits of character, habits, &c., and both poetical and prose selections, effectively relieve the descriptions of that sameness of style and matter which is found in most zoological works.



The **FOURTH READER**, in addition to Miscellaneous Selections, has divisions or "Parts" appropriated to "Human Physiology and Health," "Ornithology, or Birds," "Vegetable Physiology, or Botany," "Natural Philosophy," and "Second History," in all which there is great literary variety, well adapted for reading lesson; and, moreover, the beautiful illustrations to each useful facts. One of the cuts from "Ornithology," showing the forms, relative sizes, &c., of the "Climbing Birds," is here given.

The **FIFTH READER**, which is the highest in the Series thus far published, has, in addition to the Miscellaneous Divisions embracing a variety of the best literary selections, the eleven following "Parts."

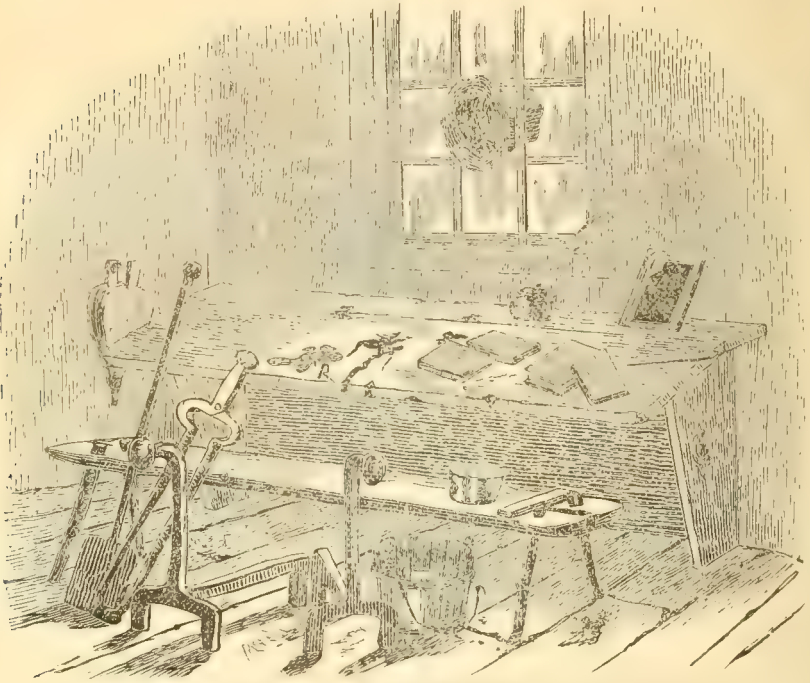
1. "Locutionary;" 2. "Herpetology, or Reptiles;" 3. "Second Division of Human Physiology and Health;" 4th. "Second Division of Vegetable Physiology, or Botany;" 5. "Entomology, or Insects;" 6. "Civil Architecture;" 7. "Second Division of Natural Philosophy;" 8. "Physical Geography;" 9. "Chemistry;" 10. "Geology;" 11. "Ancient History." We have room to introduce only one illustration from each of two of these divisions.

The Botanical Illustration here given represents the Trumpet-Flower and Labiate Families; another cut shows the features which specially characterize these families, but for which we have no room here. The Classification of Plants, in accordance with the *Natural System*, is shown chiefly by such interesting illustrations as these, which certainly accomplish far more than pages of description. Moreover, the economical uses of plants are not overlooked, and the entire treatment of the subject is well calculated to cultivate, in early life, a taste for the successful study of Nature. In the department of Ichthyology, 125 species of fish are figured. Physical Geography, Architecture, Geology, &c., have their appropriate illustrations, all teaching us full facts in science, but without the dryness which usually accompanies scientific detail.

Of the very successful manner in which the above subjects have been made to combine, the *literary variety* required in Reading-Books for youth, with *instruction in useful knowledge*, we have not room to speak here; but we commend a critical examination of the books themselves, in their design, plan, and execution, to every one interested in the subject of Educational Progress.

What a contrast between these and our earlier Reading-Books! The simple fact that publishers can now afford to illustrate, so elaborately, books designed for use in our *Common Schools*, speaks volumes for the cause of Popular Education.

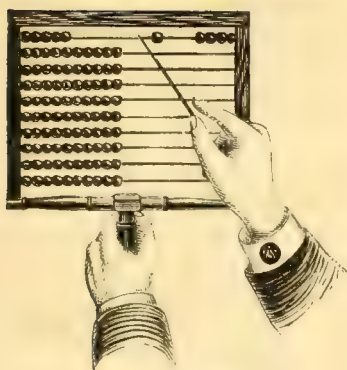
SCHOOL APPARATUS.



APPARATUS AND EQUIPMENT OF THE DISTRICT SCHOOL AS IT WAS.



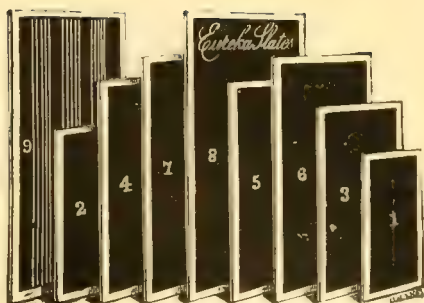
SPECIMENS OF APPARATUS OF THE SCHOOL AS IT IS.



THE ABACUS, OR NUMERAL FRAME



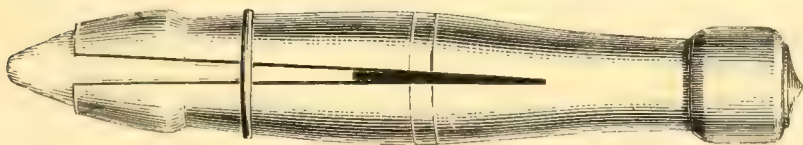
THE NEW SCHOOL GLOBE.



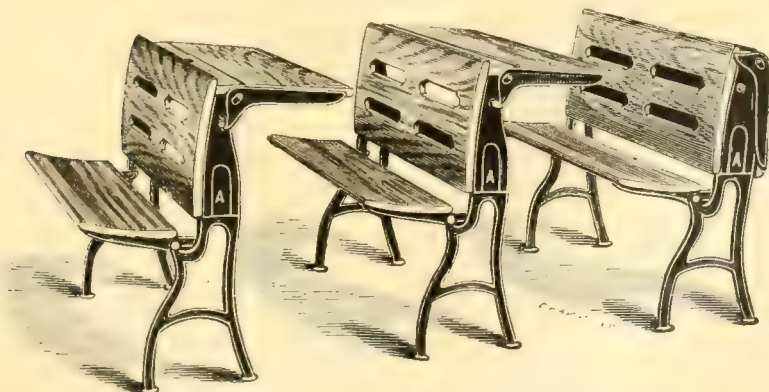
THE EUREKA WALL-SLATES.



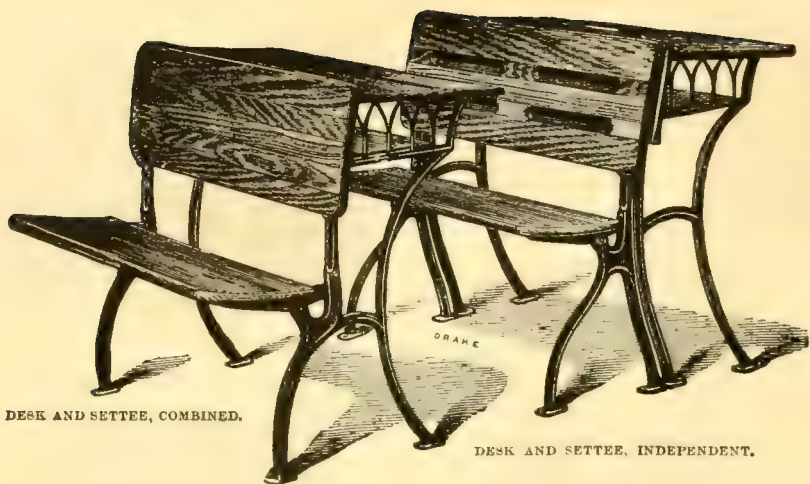
HAMMOND BLACKBOARD SUPPORT.



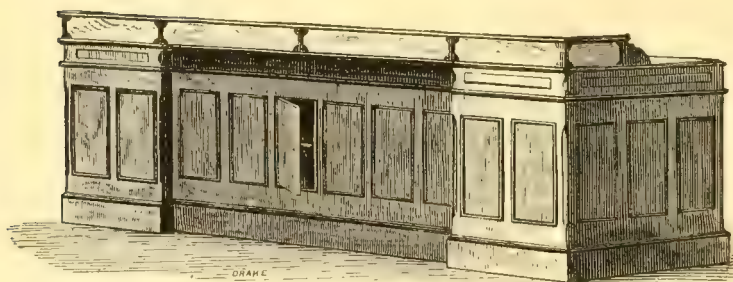
THE NEW CRAYON-HOLDER. (FULL SIZE.)



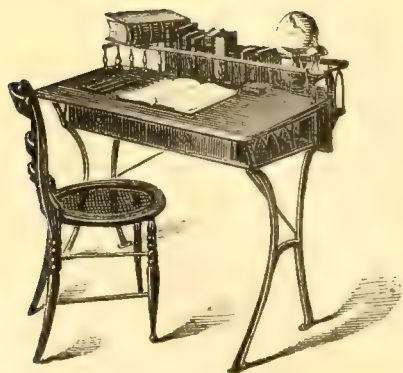
THE "ASSEMBLY" SCHOOL DESKS AND SETTEES.



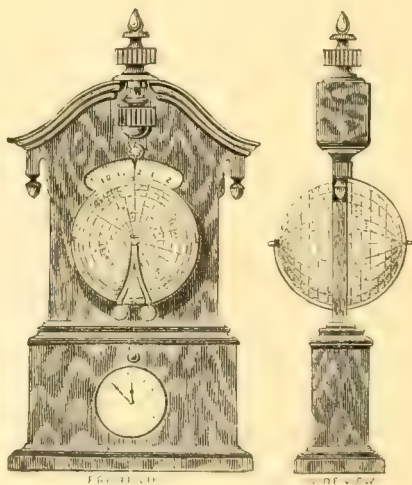
THE NEW AMERICAN DESKS. WITH ALLEN'S OPERA SEATS



PRINCIPAL'S PLATFORM DESK. (REAR VIEW.)



ASSISTANT TEACHER'S DESK.



TIMBY'S GLOBE TIME-PIECE.

CHAPTER XIX.

LIBRARIES.

At the close of the Revolution, there were very few public libraries in the country; hardly any, indeed, away from the colleges and large towns, and even these, few and small as they were, were not generally accessible. The oldest of them all was that of Harvard University, which commenced with the bequest of Harvard's books in 1638, but had been completely destroyed by fire in 1764. Great efforts were made to restore it, and before the commencement of the Revolution about \$20,000 and considerable quantities of books had been contributed for that purpose. It could, however, hardly have had more than 10,000 or 12,000 volumes at that period. The only other college libraries then in existence (all of them small, but two or three of them containing many valuable works,) were the library of Yale College, founded in 1700, which had received important additions from Bishop Berkeley and other English gentlemen; the very small library of William and Mary, at Williamsburg, Va., founded, perhaps, two or three years earlier; that of the University of Pennsylvania, founded in 1749, also small, but valuable; that of New Jersey College, at Princeton, founded in 1746; that of King's, now Columbia, College, founded in 1757, and containing at the close of the Revolution not more than 2000 volumes; and the few hundred volumes which had been collected, as nuclei of libraries, in Brown University from and after 1768, Dartmouth College from 1769, and Rutgers College from 1770 to the close of the war. Of proprietary libraries, the oldest and best was the Philadelphia Library Company and Loganian Collection, founded by Benjamin Franklin in 1731, which in 1783 contained about 5000 volumes. The Redwood Library at Newport, R. I., incorporated in 1747, though not a large collection, possessed considerable value to the classical and theological student. The New York Society Library, founded in 1754, had attained to considerable size prior to the war, but suffered much from the vandalism of the British soldiers, its books being carried off by the knapsackful and bartered for grog. In 1795 it had only 5000 volumes. The Charleston Library Society was founded a year or two earlier than the New York Society, and at the commencement of the war had between

five and six thousand volumes, aside from the library of Mr. Mackenzie, bequeathed to it about the same time. In 1778, however, this fine collection was almost entirely destroyed by fire, a small portion of the books only being rescued from the flames, and of these many being broken sets. The Providence Athenæum, founded in 1753, the Salem Athenæum in 1760, and the Portland Athenæum in 1765, small collections, but well selected, the special library of the American Philosophical Society at Philadelphia, and a state library of three or four hundred volumes, at Concord, New Hampshire, complete the catalogue of public libraries of any considerable importance at the close of the war of the Revolution.

The period immediately subsequent to the war was not favorable to the multiplication or growth of libraries; for, being among the outgrowths of an opulent and luxurious civilization, we could hardly look for their increase amid the poverty and financial revulsions which continued till nearly the close of the last century. Between 1783 and 1800, ten colleges and one theological seminary were founded, and some of them—as, for instance, Bowdoin, Georgetown, D. C., Williams, Dickinson, Transylvania, and the University of North Carolina—now possess respectable libraries, but they have been mainly accumulated within the last forty years. Of other libraries, we can find no record of even one, of any importance, founded in this period.

In the period between 1800 and the close of the war of 1812, there were five colleges and two theological seminaries organized, all of which now have libraries of considerable importance. To this period also belong the beginnings of the Boston Athenæum, now the fourth library in the country in the number of its volumes, the first library of Congress, which was destroyed by the British in 1814, the noble collection of the New York Historical Society, and the commencement of the special libraries of the American Antiquarian Society at Worcester, and the American Academy of Natural Sciences at Philadelphia.

The war of 1812 was followed by a period of severe financial distress, and it was not till about 1818 that any considerable efforts were made for the establishment of libraries. Between 1818 and the present time, not only have more than one hundred colleges been organized, each of which has a library

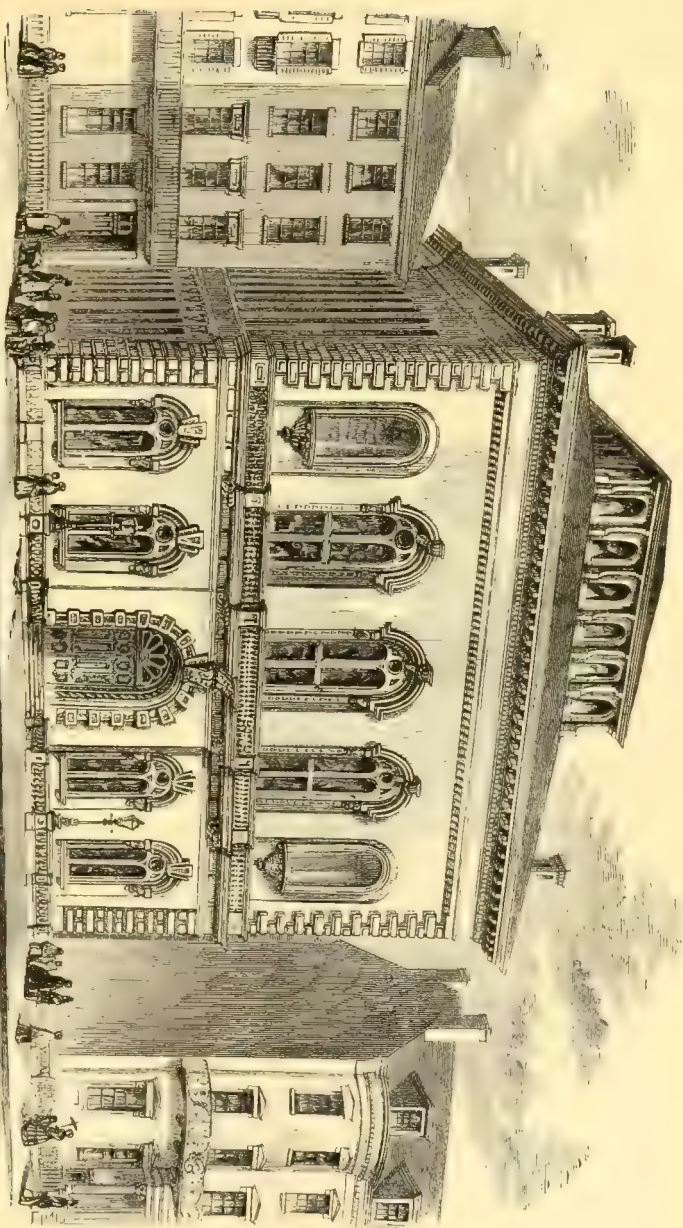
of some size, and many of them from 10,000 to 25,000 volumes, but there have also been established more than twenty theological seminaries, with considerable collections of books; most of the state libraries, beginning with the valuable State Library at Albany, of over 50,000 volumes, the Congressional, Astor, Smithsonian, Boston Public Library, and other free libraries; most of the libraries of the learned societies, and the extensive collections of the historical societies, three or four proprietary libraries of some note, all of the subscription libraries, known as mercantile, institute, mechanics', or apprentices' libraries, and those connected with young men's Christian associations and with churches. Within the same period also, and mainly within twenty years past, great numbers of special libraries—scientific, commercial, agricultural, mining, humanitarian, or devoted to the promotion of particular departments of art or literature—have been founded, while in all the states Sunday School libraries, and in many of them school-district, town, and academical libraries have been formed. Prior to 1840, there were many instances in which writers who desired to investigate certain periods of history, or certain sciences or arts, were compelled to visit Europe in order to procure from the great libraries of England or the continent the necessary facts. The necessity for this is now nearly obviated. The great libraries of Cambridge, Boston, New York, Philadelphia, and Washington, though neither of them so complete as they should be, yet together furnish material for the preparation of works in most departments of science, literature, or art, and they are every year becoming more and more full in the topics heretofore deficient.

The best free library in this country, and the largest, is the Astor Library of New York. It was founded by the bequest of \$400,000 by John Jacob Astor, of which \$75,000 was to be appropriated for the building, \$120,000 for the first purchase of books, and the remainder invested, and the interest applied to the management and increase of the library. The original building, with its furniture and shelving, opened in 1854, cost about \$120,000, the excess over \$75,000 being from accrued interest. The \$120,000 expended for books purchased about 80,000 volumes. The shelf-room (13,000 feet) being likely to prove insufficient for the wants of the library, William B. Astor, Esq., the son

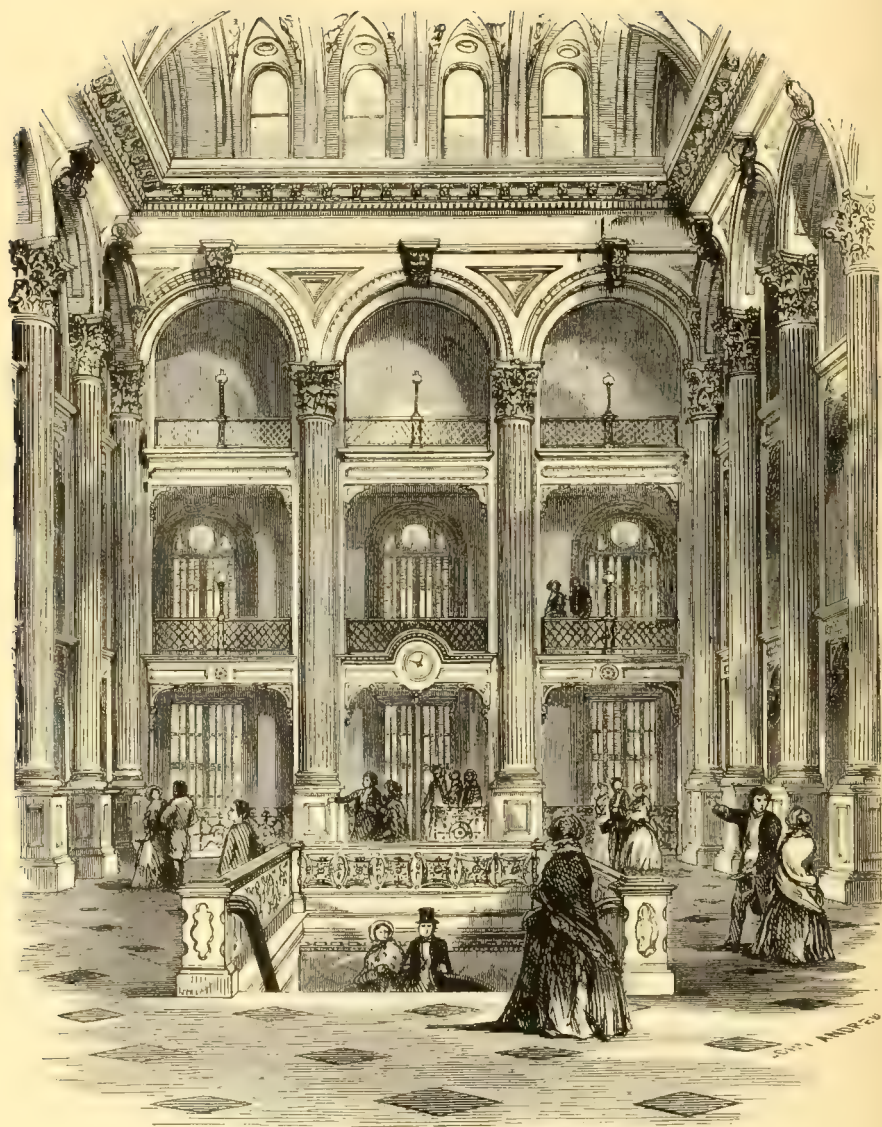
of the founder of the library, purchased a lot adjoining the north side of the library, 80 by 120 feet, and erected an additional building, somewhat larger than the original one, which he presented to the trustees. Mr. Astor has also, at different times, made considerable donations for the purchase of books. The present number of volumes in the library is somewhat more than 120,000, nearly all acquired by purchase. In his long and careful bibliographical preparation for purchasing this library, in his judicious selections, and careful expenditures, Dr. Cogswell, the librarian-in-chief, has established a claim to the gratitude of all scholars.

The library of Harvard University has grown up since 1764, when the original library was destroyed by fire, by numerous donations of books, and, in quite a number of instances, of entire libraries, as well as by donations and bequests of money from friends. These donations and bequests cannot fall much short of \$150,000, and it has now a fund of \$26,000, the interest of which is applicable to the purchase of books, and the sum of \$5000 per year, for five years from 1859, pledged by William Gray, Esq., to be applied to the same purpose. The various collections of books in Gore Hall (the library building) include not only the college library proper, but also the society libraries, and the libraries of the divinity, law, and medical schools. The whole number of volumes is about 125,000, but the library is very miscellaneous in character, and incomplete in certain departments. The considerable sums it now has at command for purchases are applied to make good its deficiencies as far and as fast as possible.

The Boston City Library, a free public library, now ranks third in this country. It was founded in 1848, in accordance with a law of Massachusetts providing for the establishment of town libraries. Hon. Josiah Quincy, jr., then mayor of the city, gave \$5000 toward it; Mr. Bigelow gave \$1000; Mr. Everett and Mr. Winthrop, large donations of books; Mr. Joshua Bates, of London, \$50,000, besides several thousand volumes; Mr. Jonathan Phillips, \$10,000; and others, smaller sums. The building, erected at a cost of \$363,000 by the city of Boston, is one of the finest library rooms in the world. The present number of volumes is a little more than 100,000, and is increasing at the rate of 8000 volumes per annum. During the present year (1861) also, it will



BOSTON CITY LIBRARY. EXTERIOR.



BOSTON CITY LIBRARY. INTERIOR.

receive the fine library bequeathed to it by the late Theodore Parker, consisting of nearly 18,000 volumes.

The Boston Athenæum ranks fourth in the number of its volumes, is peculiarly rich in the transactions of learned societies, and has a considerable portion of General Washington's library. It has now about 75,000 volumes, and has cost for its building and books full \$300,000. Though a proprietary library, it is practically free to the public for consultation. It was founded in 1806, but its principal growth has been within the last twenty-five years.

The library of Congress, which was nearly destroyed by fire in 1851, has since been restored and largely increased. The purchases being made under the direction of a committee of the two Houses, comprising their most eminent scholars, are judicious, and the library, which contains about 65,000 volumes, is one of the best for reference and consultation in the country. The library of the House of Representatives, also in the Capitol, contains about 40,000 volumes.

The Philadelphia Library Company and Loganian Collection is another of the proprietary libraries which are accessible to the public for consulting purposes free of charge. Though founded 130 years ago, its growth has been mainly achieved during the present century. In 1800, it contained only 7000 or 8000 volumes, while its present number is about 70,000.

The New York Mercantile Library is the largest of the subscription and lending libraries which are found in most of the considerable towns of the United States. It possesses a fine edifice in Astor Place, which cost nearly \$240,000, and the rent of that portion of the building not occupied for library purposes and reading-rooms, will give it, when its debt is liquidated, a considerable annual fund in addition to its receipts for membership. Its reading-room is the largest in the country, though the free reading-room of the Cooper Institute very nearly approaches it. Its library, though intended mainly for popular readers rather than scholars, contains a very considerable collection of valuable works of reference. Its present number of volumes is about 60,000.

The New York State Library at Albany is by far the largest of all the state libraries, and is especially valuable for its fine collection of works on American history and on the natural sciences. It was founded in

1818, but its principal increase has been since 1845, at which time the Warden collection of works on America was purchased and incorporated in the library. The late Dr. T. Romeyn Beck superintended it for many years, and to his judicious purchases it is indebted for much of its value. Its present number of volumes is not far from 55,000.

The library of the Smithsonian Institution at Washington, though not so large as some others, numbering little more than 35,000 volumes, is a very valuable collection. The aim of Dr. Henry, the secretary of the institution, has been to make it particularly full in those departments in which other libraries are deficient. Its books are loaned to eminent scholars at a distance, when needed for the preparation of works of importance. For some years it received a copy of all copyright books in the country.

The American Antiquarian Society at Worcester has an exceedingly valuable collection on American antiquities. Founded in 1812, by the late Isaiah Thomas, who was for twenty years its president, and who gave it about 9000 volumes, it has now about 26,000 volumes, many of them unique in this country.

The New York Historical Society, founded in 1804, has a very valuable library of about 30,000 volumes, mainly confined to American history and literature; a museum of American relics and antiquities; a large picture gallery; and has recently purchased the fine collection of Egyptian antiquities procured by the late Dr. Abbott.

The American Academy of Natural Sciences at Philadelphia has a museum of natural history of nearly 30,000 specimens, and a library of about 27,000 volumes, more complete in natural history than any other, and also containing a very full collection of the revolutionary literature of France, presented them by Mr. William Maclure.

Two other foundations for libraries are deserving of notice: that of George Peabody, Esq., for the Peabody Institute at Baltimore, which contemplates a library in connection with a gallery of the fine arts, a musical conservatory, etc., the entire endowment amounting to \$600,000; and that of the late David Watkinson, of Hartford, Connecticut, who left, in 1857, the sum of \$100,000 to found a library of reference in connection with the Connecticut Historical Society, and also made that library his residuary legatee.

These are the most remarkable public libraries of the country. There are, according

to the latest returns, 3 libraries containing over 100,000 volumes each; 9 containing over 50,000 volumes each; 19 containing 30,000 volumes or more; 26 containing 25,000 volumes or more; 41 containing over 20,000; and 120 containing 10,000 or more.

The total aggregate of volumes in college, state, national, proprietary, subscription, free, and town libraries, is not far from 3,800,000, and is increasing with great rapidity.

There are, besides these, in many of the states, school-district and academic libraries, containing a very large aggregate amount of books. In the state of New York, the number of volumes in the academic libraries reporting to the Board of Regents exceeds 125,000; and the number of volumes in the common-school libraries exceeds 1,500,000. Massachusetts, New Hampshire, Connecticut, Ohio, Michigan, Indiana, Illinois, Wisconsin, and Iowa, also make provision for such libraries, and have large numbers of them. The latest school returns indicate that the number of volumes in this class of libraries is not far from 4,000,000.

Another class of libraries, containing in the aggregate a vast number of volumes, and in many cases works of considerable size and value, are the Sunday School libraries. Few of these contain less than 200 volumes, and many of them have 1000 or more. More than 4000 different works have been published for these libraries within a few years past by the publishing societies and private publishers, and large drafts are also made by the larger schools on English publications and those intended for adults. Estimating the number of these schools at 35,000, or about two thirds the number of churches (an estimate considerably below the truth), and the volumes in each library at 200, we have an aggregate of 7,000,000 volumes collected in these humble libraries.

As might be expected, the rapid growth of public libraries has stimulated gentlemen of wealth and intellectual tastes to collect private libraries of considerable extent, and in many cases devoted to some specialty. Perhaps the largest of these private collections is that of James Lenox, Esq., of New York, which is especially rich in early works and in Bibles.

One of the most singular is that of John Allan, Esq., of the same city, which contains a very considerable collection of books which have been interleaved and illustrated by the collector, with choice engravings of

the persons or events described, often to the number of some hundreds in each volume.

There are in the city of New York alone not less than 25 private libraries containing more than 10,000 volumes each, and in Boston a still larger number. Philadelphia has also many very choice private libraries.

Some of these private collections are very complete on American local history. Noticeable among these are the libraries of Peter Force, Esq., of Washington, D. C.; George Brinley, Esq., of Hartford, Connecticut; George W. Greene, of Providence, R. I.; and Messrs. George Bancroft, J. C. Brevoort, W. J. Davis, H. C. Murphy, William Menzies, and J. R. Brodhead, of New York. The library of Hon. Henry Barnard, at Hartford, Connecticut, is more complete on the subject of education than any other in the country; that of W. Parker Foulke, Esq., of Philadelphia, is very full on prisons and prison discipline, and that of S. Austin Allibone, Esq., of the same city, on English literature and criticism; that of David N. Lord, of New York, on ecclesiastical and polemic literature; that of Professor Charles Anthon, of the same city, contains a fine collection of classics and works on classical literature; that of G. W. Pratt, also of New York, on Oriental languages and literature; that of C. L. Bushnell, on numismatics; that of J. A. Stevens, jr., on the literature of the Middle Ages; those of Messrs. W. P. Chapman and R. G. White, on dramatic and especially Shakspearian literature; that of D. W. Fiske, on Scandinavian literature; that of George Folsom, on history and geography; that of R. M. Hunt, on architecture; and those of Archbishop Hughes, Rev. Dr. Forbes, Rev. Dr. Hatfield, and Rev. Dr. Bethune, on theology, ecclesiastical biography, and patristic literature.

There are in connection with many of our benevolent and humane institutions special libraries containing a few hundred or thousand volumes devoted to the particular work of those institutions. Thus, the American Asylum for the Deaf and Dumb, at Hartford, and the New York Institution for the Deaf and Dumb, have each a very considerable collection of works on deaf mute instruction; the American Bible Society has a fine collection of Bibles in all languages; and the American Bible Union, a valuable collection of works on biblical criticism and exegesis, procured for the use of its translators.

LIBRARIES OF COLLEGES, THEOLOGICAL SEMINARIES, &c.

When founded.	Name.	Location.	No. of volumes.
1638,	Harvard College.	Cambridge, Mass.	184,000
1692,	William and Mary.	Williamsburg, Va.	4,500
1701,	Yale College.	New Haven, Conn.	97,000
1746,	College of New Jersey.	Princeton, N. J.	33,000
1757,	University of Pennsylvania.	Philadelphia, Penn.	8,500
1767,	Columbia College.	New York City, N. Y.	20,000
1768,	Brown University.	Providence, R. I.	38,000
1769,	Dartmouth College.	Hanover, N. H.	39,000
1779,	Rutgers College.	New Brunswick, N. J.	12,000
1781,	Washington and Lee College.	Lexington, Va.	6,500
1783,	Dickinson College.	Carlisle, Penn.	26,000
1784,	St. John's College.	Annapolis, Md.	8,000
1785,	Charleston College.	Charleston, S. C.	8,000
1785,	University of Georgia.	Athens, Ga.	18,500
1789,	Hampden-Sydney College.	Prince Edward's Co., Va.	7,200
1789,	University of North Carolina.	Chapel Hill, N. C.	23,000
1791,	University of Vermont.	Burlington, Vt.	17,000
1792,	Georgetown College.	Georgetown, D. C.	3,000
1793,	Williams College.	Williamstown, Mass.	20,000
1794,	Bowdoin College.	Brunswick, Me.	32,800
1795,	Union College.	Schenectady, N. Y.	18,000
1798,	Kentucky University.	Lexington, Ky.	5,000
1801,	Middlebury College.	Middlebury, Vt.	14,000
1801,	University of South Carolina.	Columbia, S. C.	25,000
1802,	Washington and Jefferson College.	Cannonsburg, Penn.	18,000
1804,	Ohio University.	Athens, Ohio.	5,800
1804,	University of East Tennessee.	Knoxville, Tenn.	8,500
1806,	University of Nashville.	Nashville, Tenn.	11,000
1808,	Mount St. Mary's College.	Near Emmettsburg, Md.	5,500
1809,	Miami University.	Oxford, Ohio.	9,500
1812,	Hamilton College.	Clinton, N. Y.	13,000
1817,	Alleghany College.	Meadville, Penn.	10,000
1819,	University of Virginia.	Charlottesville, Va.	36,000
1819,	St. Joseph's College.	Bardonia, Ky.	10,000
1820,	Colby University.	Waterville, Me.	10,000
1821,	Columbia College.	Washington, D. C.	8,000
1821,	Amherst College.	Amherst, Mass.	35,000
1823,	Centre College.	Danville, Ky.	6,000
1823,	Trinity College.	Hartford, Conn.	14,000
1823,	Hobart Free College.	Geneva, N. Y.	14,000
1826,	Kenyon College.	Gambier, Ohio.	18,000
1826,	Western Reserve College.	Hudson, Ohio.	11,000
1828,	Indiana University.	Bloomington, Ind.	5,500
1830,	Spring Hill College.	Spring Hill (near Mobile), Ala.	8,500
1831,	University of Alabama.	Tusculooosa, Ala.	12,000
1831,	University of New York.	New York City, N. Y.	6,000
1831,	Wesleyan University.	Middletown, Conn.	27,000
1832,	Pennsylvania College.	Gettysburg, Penn.	18,000
1832,	Denison University.	Granville, Ohio.	11,000
1832,	Randolph-Macon College.	Lynchburg, Va.	10,500
1832,	Hanover College.	South Hanover, Ind.	7,000
1832,	St. Louis University.	St. Louis, Mo.	22,500
1832,	Lafayette College.	Easton, Pa.	8,500
1833,	Wabash College.	Crawfordsville, Ind.	11,000
1833,	Delaware College.	Newark, Del.	10,000
1833,	Haverford College.	West Haverford, Pa.	7,400
1834,	Oberlin College.	Oberlin, Ohio.	12,000
1835,	Marietta College.	Marietta, Ohio.	23,500
1835,	McKendree College.	Lebanon, Ill.	6,500
1836,	Franklin and Marshall College.	Lancaster, Penn.	19,000
1836,	Alfred University.	Alfred, N. Y.	5,500
1837,	University of Michigan.	Ann Arbor, Mich.	23,000
1837,	Indiana Asbury University.	Greencastle, Ind.	10,000
1838,	Wake Forest College.	Forestville, N. C.	8,000
1837,	Emory College.	Oxford, Ga.	7,500
1838,	Emory and Henry College.	Washington Co., Va.	9,000
1840,	Davidson College.	Mecklenburg Co., N. C.	6,000
1840,	St. John's College.	Fordham, N. Y.	16,000
1840,	Mercer University.	Pemfield, Ga.	9,000
1840,	Georgetown College.	Georgetown, Ky.	10,000
1840,	St. Xavier's College.	Cincinnati, Ohio.	17,000
1842,	St. James's College.	Washington, Co., Md.	10,000
1842,	Ohio Wesleyan University.	Delaware Co., Ohio.	14,000
1842,	Cumberland University.	Lebanon, Tenn.	5,500
1842,	University of Notre Dame du Lac.	Notre Dame, Ind.	7,500
1843,	Holy Cross.	Worcester, Mass.	42,000
1845,	Wittenberg University.	Springfield, Ohio.	6,500
1846,	Madison University.	Hamilton, N. Y.	8,500
1847,	St. Mary's College.	Wilmington, Del.	6,000
1847,	College of St. Francis Xavier.	New York City.	17,000
1848,	College of the City of New York.	New York City.	16,500
1848,	University of Mississippi.	Oxford, Miss.	5,500
1849,	Lawrence University.	Appleton, Wis.	7,000
1850,	Rochester University.	Rochester, N. Y.	8,500
1850,	Trinity College.	Randolph Co., N. C.	7,800

*Those containing less than 5,000 volumes are not noticed.

When founded.	Name.	Location.	No. of volumes.
1851,	Mount St. Mary's of the West.....	Near Cincinnati, Ohio.....	10,500
1851,	College of Christian Brothers.....	St. Louis, Mo.....	5,500
1852,	Lombard University.....	Galesburg, Ill.....	5,500
1853,	Ronan College.....	Salem, Roanoke Co., Va.....	7,500
1853,	Westminster College.....	Fulton, Mo.....	5,100
1854,	Tufts College.....	Medford, Mass.....	10,500
1854,	Knox College.....	Galesburg, Ill.....	6,500
1855,	Northwestern University.....	Evansville, Ill.....	5,500
1856,	St. Lawrence University.....	Canton, N. Y.....	6,500
1856,	Sutton Hall College.....	South Orange, N. J.....	8,300
1857,	Loyola College.....	Baltimore, Md.....	25,000
1857,	Washington University.....	St. Louis, Mo.....	6,500
	Santa Clara College.....	Santa Clara, Cal.....	11,000
	Iowa College.....	Grinnell, Iowa.....	6,400
	College of the Immaculate Conception.....	New Orleans, La.....	6,500
	Louisiana State University.....	Baton Rouge, La.....	8,400
	Wofford College.....	Spartanburg, S. C.....	5,500
1859,	Griswold College.....	Davenport, Iowa.....	5,400
1859,	St. Benedict's College.....	Atchison, Kansas.....	12,000
1860,	Augustana College.....	Geneseo, Ill.....	7,500
1861,	Vassar College.....	Poughkeepsie, N. Y.....	7,500
1862,	St. Joseph's College.....	Philadelphia, Pa.....	6,250
1863,	Boston College.....	Boston, Mass.....	6,500
1863,	Manhattan College.....	New York City.....	6,200
1864,	Bates College.....	Lewiston, Me.....	7,300
1865,	Cornell University.....	Ithaca, N. Y.....	50,000
1867,	Howard University.....	Washington, D. C.....	6,500

THEOLOGICAL SEMINARIES.

1784,	Theological Seminary Reformed Dutch Church.....	New Brunswick, N. J.....	10,000
1791,	St. Mary's Theological Seminary.....	Baltimore, Md.....	10,000
1808,	Andover Theological Seminary.....	Andover, Mass.....	31,000
1812,	Princeton Theological Seminary.....	Princeton, N. J.....	21,000
1816,	Divinity School.....	Cambridge, Mass.....	13,000
1816,	Bangor Theological Seminary.....	Bangor, Me.....	12,000
1817,	Episcopal General Theological Seminary.....	New York.....	14,500
1820,	Hamilton Theological Seminary.....	Hamilton, N. Y.....	10,000
1821,	Auburn Theological Seminary.....	Auburn, N. Y.....	6,000
1821,	South-Western Theological Seminary.....	Marysville, Tenn.....	6,000
1822,	Episcopal Theological School.....	Fairfax Co., Va.....	9,500
1824,	Union Theological Seminary.....	Gettysburg, Penn.....	12,500
	Gettysburg Theological Seminary.....	Gettysburg, Penn.....	5,500
1825,	Newton Theological Institution.....	Newton, Mass.....	12,500
1825,	Wittenburg Theological Seminary.....	Gettysburg, Penn.....	8,500
1825,	German Reformed Theological Seminary.....	Mercesburg, Penn.....	7,500
1827,	Theological Department Kenyon College.....	Gambier, Ohio.....	10,000
1828,	Western Theological Seminary.....	Allegheny, Penn.....	10,000
1828,	Theological Seminary.....	Columbia, S. C.....	13,500
1829,	Lane Seminary.....	Cincinnati, Ohio.....	15,500
1832,	Shurtleff College Theological Department.....	Upper Alton, Ill.....	7,500
1834,	Theological Institute.....	Hartford, Conn.....	31,000
1836,	Union Theological Seminary.....	New York.....	10,000
1838,	St. Charles Brunning Theological Seminary.....	Philadelphia, Penn.....	5,200
1840,	Concordia Seminary.....	St. Louis, Mo.....	9,500
1844,	Western Theological School.....	Meadville, Penn.....	7,000
1844,	St. Vincent's College Theological Department.....	Cape Girardeau, Mo.....	8,100
1844,	Ohio Wesleyan Seminary.....	Delaware, Ohio.....	6,000
1844,	Seminary of St. Mary of the Lake.....	Chicago, Ill.....	12,000
1846,	St. Vincent's College Theological Department.....	St. Vincent, Pa.....	13,000
1850,	Rochester Theological Seminary.....	Rochester, N. Y.....	10,000
1851,	Mount St. Mary's of the West.....	Near Cincinnati, Ohio.....	8,500
1853,	Danville Theological Seminary.....	Danville, Ky.....	5,500
1859,	Southern Baptist Theological Seminary.....	Greenville, S. C.....	8,000
1859,	Theological Seminary of the N. W. College.....	Chicago, Ill.....	5,500
1859,	Griswold College Theological Department.....	Davenport, Iowa.....	6,500
1862,	Episcopal Divinity School.....	Philadelphia, Penn.....	10,500
1865,	Oberlin College Theological Department.....	Oberlin, Ohio.....	11,000
1867,	Drew Theological Seminary.....	Madison, N. J.....	

MEDICAL SCHOOLS AND HOSPITAL.

1755,	Pennsylvania Hospital Library.....	Philadelphia, Penn.....	11,000
1765,	Medical Department Pennsylvania University.....	Philadelphia, Penn.....	5,000
1791,	New York Hospital Library.....	New York.....	8,000
1807,	New York College of Physicians and Surgeons.....	New York.....	2,000
1831,	University Medical School.....	New York.....	4,500
	University of Virginia Medical Department.....		35,000

LAW SCHOOLS AND LIBRARIES.

1817,	Dane Law School.....	Cambridge, Mass.....	14,000
1845,	New York State and National Law School.....	Poughkeepsie, N. Y.....	3,000
	New York Law Library.....	New York.....	6,500
	Social Law Library.....	Boston.....	6,000
1802, } 1841, } 1859,	Law Associations.....	Philadelphia, Penn.....	5,000
	Michigan University Law Department.....	Ann Arbor, Mich.....	3,000

PRINCIPAL LIBRARIES OF THE UNITED STATES, EXCLUSIVE OF THOSE CONNECTED WITH COLLEGES, &C.

When founded.	Name.	Location.	No. of volumes.
1853,	San Francisco Mercantile Library.....	San Francisco, Cal.....	25,000
1838,	Hartford Young Men's Institute.....	Hartford, Conn.....	22,835
1839,	Connecticut Historical Society.....	do.....	12,000
1854,	Connecticut State Library.....	do.....	3,500
1856,	New Haven Young Men's Institute.....	New Haven, Conn.....	11,000
1788,	Wilmington Young Men's Association.....	Wilmington, Del.....	6,189
1833,	Savannah Historical Society.....	Savannah, Ga.....	7,900
1831,	Indiana State Library.....	Indianapolis, Ind.....	26,000
1835,	Catholic Diocesan Library.....	Vincennes, Ind.....	12,000
1836,	Keokuk Library Association.....	Keokuk, Iowa.....	6,600
	Dubuque Library.....	Dubuque, Iowa.....	8,000
	Lexington City Library.....	Lexington, Ky.....	14,600
1838,	Louisiana State Library.....	Baton Rouge, La.....	14,000
1844,	Lyceum Library.....	New Orleans, La.....	12,000
	Mechanics' Library.....	do.....	15,000
1839,	Maine State Library.....	Augusta, Me.....	31,500
1867,	Skowhegan Library.....	Skowhegan, Me.....	2,315
1827,	Maryland State Library.....	Annapolis, Md.....	25,000
1862,	Baltimore Peabody Institute.....	Baltimore, Md.....	42,588
1839,	Baltimore Mercantile Library.....	do.....	24,975
1843,	Maryland Historical Society.....	do.....	17,000
1847,	Maryland Institute Library.....	do.....	18,060
1840,	Odd Fellows' Library.....	do.....	13,000
1858,	Arlington Public Library.....	Arlington, Mass.....	2,115
1867,	Barnstable Sturgis Library.....	Barnstable, Mass.....	1,845
1855,	Beverly Public Library.....	Beverly, Mass.....	4,810
1839,	Bolton Public Library.....	Bolton, Mass.....	1,300
1853,	American Congregational Library.....	Boston, Mass.....	10,000
1847,	Boston Athenæum.....	do.....	165,000
1794,	Boston Library.....	do.....	19,800
1791,	Massachusetts Historical Society.....	do.....	18,500
1848,	Mattapon Literary Association.....	do.....	3,000
1848,	Boston Public City Library.....	do.....	160,000
1850,	Mercantile Library.....	do.....	21,000
1831,	Natural History Society.....	do.....	13,000
1864,	New Church Library.....	do.....	1,200
1825,	Massachusetts State Library.....	do.....	31,500
1857,	Young Men's Christian Association.....	do.....	5,610
1837,	North Bridgewater.....	North Bridgewater, Mass.....	2,667
1864,	Brighton Holton Library.....	Brighton, Mass.....	5,108
1857,	Brookfield Merrick Public Library.....	Brookfield, Mass.....	2,247
1857,	Brookline Public Library.....	Brookline, Mass.....	12,000
1857,	Dana Library.....	Cambridge, Mass.....	4,800
1860,	Charlestown Public Library.....	Charlestown, Mass.....	10,955
1863,	Chelsea Public Library.....	Chelsea, Mass.....	2,345
	Chicopee Public Library.....	Chicopee, Mass.....	2,800
	Egglew Library.....	Clinton, Mass.....	
1851,	Concord Public Library.....	Concord, Mass.....	5,984
1850,	Peabody Institute.....	Danvers, Mass.....	
1810,	Deerfield Library Association.....	Deerfield, Mass.....	2,100
1831,	Fall River Public Library.....	Fall River, Mass.....	6,623
1859,	Fitchburg Public Library.....	Fitchburg, Mass.....	8,500
1855,	Frammingham Public Library.....	Frammingham, Mass.....	
1854,	Lyceum Library.....	Gloucester, Mass.....	3,000
1855,	Public Library.....	Groton, Mass.....	1,665
	Public Library.....	Harvard, Mass.....	1,400
1868,	Public Library.....	Hingham, Mass.....	2,000
1862,	Public Library.....	Lancaster, Mass.....	4,500
1861,	Public Library.....	Leicester, Mass.....	2,953
	Franklin Library.....	Lawrence, Mass.....	5,400
1854,	Pacific Mills Library.....	do.....	5,600
1864,	Public Library.....	Leominster, Mass.....	4,556
1867,	Young Men's Christian Association.....	Lowell, Mass.....	
	Lowell City Library.....	do.....	15,121
1850,	Public Library.....	Lunenburg, Mass.....	1,350
1862,	Public Library.....	Lynn, Mass.....	12,872
1866,	Public Library.....	Millbury, Mass.....	1,265
1857,	Public Library.....	Natick, Mass.....	2,540
1852,	Public Library.....	New Bedford, Mass.....	23,000
1854,	Free Library.....	Newburyport, Mass.....	13,600
1849,	Public Library.....	Newton, Mass.....	1,800
1840,	Public Library.....	Northampton, Mass.....	5,400
1854,	Peabody Institute.....	Peabody, Mass.....	14,300
1862,	Phillips' Free Public Library.....	Phillipston, Mass.....	2,223
1850,	Pittsfield Mercantile Library.....	Pittsfield, Mass.....	3,500
1869,	Public Library.....	South Reading, Mass.....	8,500
1857,	Roxbury Athenæum Library.....	Roxbury, Mass.....	
1810,	Salem Athenæum Library.....	Salem, Mass.....	13,755
1854,	Arms Library.....	Shelburne Falls.....	3,437
1830,	Public Library.....	Shelborn, Mass.....	1,500
1857,	Public Library.....	Springfield, Mass.....	30,488
1862,	Jackson Library.....	Stonebridge, Mass.....	4,000
1858,	Public Library.....	Stonham, Mass.....	3,400
1852,	Public Library.....	Southborough, Mass.....	2,511
1863,	Goodenow Library.....	South Sudbury, Mass.....	4,284

When founded.	Name.	Location.	No. of volumes.
1866,	Public Library.....	Taunton, Mass.....	4,395
1867,	Public Library.....	Waltham, Mass.....	5,900
1868,	Public Library.....	Watertown, Mass.....	
1870,	Public Library.....	Wayland, Mass.....	4,056
1871,	Public Library.....	Westboro, Mass.....	1,642
1878,	Westfield Athenæum Library.....	Westfield, Mass.....	2,200
1879,	Public Library.....	Westford, Mass.....	1,644
1887,	Public Library.....	Weston, Mass.....	3,180
1887,	Public Library.....	Winchendon, Mass.....	1,295
1879,	Public Library.....	Winchester, Mass.....	2,240
1866,	Public Library.....	Woburn, Mass.....	3,944
1870,	Public Library.....	Worcester, Mass.....	24,000
1872,	American Antiquarian Society.....	do.....	52,000
1865,	Public Library.....	Detroit, Mich.....	21,500
1882,	Young Men's Society.....	do.....	11,500
1878,	Michigan State Library.....	Lansing, Mich.....	32,000
1854,	Minneapolis Athenæum.....	Minneapolis, Minn.....	2,378
1849,	Minnesota Historical Society.....	St. Paul, Minn.....	5,100
1845,	St. Louis Public Library.....	St. Louis, Mo.....	13,800
1846,	St. Louis Mercantile Library Association.....	do.....	34,238
1855,	Public City Library.....	Concord, N. H.....	3,884
1844,	City Library.....	Manchester, N. H.....	14,500
1877,	Portsmouth Athenæum Library.....	Portsmouth, N. H.....	10,400
1847,	Newark Library Association.....	Newark, N. J.....	17,500
1878,	Public Library.....	Newton, N. J.....	
1848,	New York State Library.....	Albany, N. Y.....	90,500
1843,	Young Men's Association.....	do.....	12,121
1857,	Brooklyn Mercantile Library.....	Brooklyn, N. Y.....	40,000
1835,	Buffalo Young Men's Association.....	Buffalo, N. Y.....	18,000
	Grovener Library.....	do.....	1,000
1820,	Apprentices' Library.....	New York City, N. Y.....	46,740
1848,	Astor Library.....	do.....	178,000
1850,	Cooper Union.....	do.....	10,000
1820,	Mercantile Library.....	do.....	154,513
1853,	Society Library.....	do.....	32,000
1844,	New York Historical Society Library.....	do.....	28,000
1839,	Rochester Athenæum Library.....	Rochester, N. Y.....	21,000
1844,	Troy Young Men's Association.....	Troy, N. Y.....	18,678
1848,	Public Library.....	Syracuse, N. Y.....	9,310
1845,	Cincinnati Public Library.....	Cincinnati, Ohio.....	33,588
1845,	Mercantile Library.....	do.....	35,206
1845,	Theological and Religious Library.....	do.....	4,500
1840,	Ohio School Library.....	do.....	25,400
1843,	Cleveland Library Association.....	Cleveland, Ohio.....	11,400
1863,	Public Library.....	do.....	2,500
1817,	Ohio State Library.....	Columbus, Ohio.....	34,000
	Dayton Public School Library.....	Dayton, Ohio.....	12,000
1864,	Portland Library Association.....	Portland, Oreg.....	3,500
1877,	Pennsylvania State Library.....	Harrisburg, Pa.....	41,000
1812,	Academy of Natural Sciences.....	Philadelphia, Pa.....	22,580
1814,	Philadelphia Athenæum.....	do.....	11,500
1827,	Mechanics' Library.....	do.....	25,000
1821,	Mercantile Library.....	do.....	50,000
1831,	Philadelphia Library Company.....	do.....	85,005
1750,	Loggia Library.....	do.....	
1844,	Young Men's Christian Association.....	do.....	3,800
1821,	Apprentice's Library.....	do.....	22,029
1821,	American Philosophical Society.....	do.....	18,000
1847,	Pittsburg Mercantile Library.....	Pittsburg, Pa.....	10,200
1847,	Newport Public Library.....	Newport, R. I.....	5,225
1720,	Redwood Library and Athenæum.....	do.....	18,460
1753,	Providence Athenæum.....	Providence, R. I.....	32,444
1814,	South Carolina State Library.....	Columbia, S. C.....	13,000
1748,	Charleston Library Society.....	Charleston, S. C.....	21,000
1854,	Tennessee State Library.....	Nashville, Tenn.....	13,000
1820,	Vermont State Library.....	Montpelier, Vt.....	12,265
1823,	Virginia State Library.....	Richmond, Va.....	21,000
1847,	Milwaukee Young Men's Association.....	Milwaukee, Wis.....	12,566
1915,	Library of Congress.....	Washington, D. C.....	266,000
	Library of House of Representatives.....	do.....	28,000
1837,	Patent Office Library.....	do.....	28,598
1789,	Library of State Department.....	do.....	20,000
	Library of Treasury Department.....	do.....	3,410
1814,	Washington Library.....	do.....	12,000
1862,	Library of Agricultural Department.....	do.....	9,500

CHAPTER XX.

LYCEUMS, MECHANICS' INSTITUTES, YOUNG MEN'S INSTITUTES, ART UNIONS, ETC.

THE name of *Lyceum* is one of ancient origin, having been first bestowed on the place where Aristotle gave his instructions, from its connection with the temple of Apollo Lycius. In more modern times it

has been applied to schools where the philosophy of Aristotle was taught, and to institutions in which the instruction was given mainly by lectures. In 1786 it was given, in France, to an institution of the nature of a museum, at which daily lectures were delivered by La Harpe. This was discontinued in 1794, in consequence of the French Revolution. During the present century the

name has been applied in France to collegiate schools answering very nearly to our colleges or public high schools.

The Conservatory of Arts and Trades at Paris, organized in 1796, by Vaucanson, is an example of the higher class of lyceum in its more extended sense. It has thirteen galleries of materials and machines, and courses of lectures, scientific and practical, which are largely attended during the winter by the working classes.

The origination of the lyceum as a means of mutual instruction in this country is due, in the first instance, to Benjamin Franklin. His "club for mutual improvement" was founded in Philadelphia in 1727, and after forty years' existence became the basis of the American Philosophical Society, one of the highest scientific societies on this continent. There may have been, and probably were, other societies for mutual improvement organized in different towns and cities of the country, during the hundred years that followed the organization of Franklin's club; but there are no records of any such in the possession of the public, previous to 1824, when Timothy Claxton, an English mechanic, succeeded in founding one, or rather in modifying a reading society, which had been in existence for five years, into what was really a lyceum, in the village of Methuen, Mass. Its exercises were weekly, and in the following order: the first week, reading by all the members; the second week, reading by one member selected for the purpose; the third week, an original lecture; the fourth week, discussion. In 1826, Mr. Josiah Holbrook, then of Derby, Conn., communicated to the *American Journal of Education*, then conducted by Mr. William Russell, his views on the subject of "*Associations of Adults for the Purpose of Mutual Education*," in which were contained the germs of the plan of the *Lyceum*, as subsequently developed by him in his lectures and publications. From the first, his views were of wider scope than the organization of a mere local association; they comprehended the establishment of such associations in every town and village, and their union, by representation, in county, state, and national organizations. They contemplated also, not only mutual instruction in the sciences, but the establishment of institutions for the education of youth in science, art, and morals; the collection of libraries, and of cabinets of minerals and other arti-

cles of natural or artificial production, to be increased and enlarged by mutual exchanges, by the different associations. Lectures and practical agricultural occupation, the results of which, it was supposed, would materially diminish the cost of instruction, also formed a part of his programme.

The first association formed in accordance with this plan was organized at Millbury, Mass., by Mr. Holbrook himself, in November of the same year, and was called "Millbury Lyceum, No. 1, Branch of the American Lyceum." Other towns soon after organized lyceums, and these were combined a few months later into the Worcester County Lyceum. Not long after, the Windham County, Conn., Lyceum, with its constituent town lyceums, was established; Rev. Samuel J. May, then of Brooklyn, Conn., rendering valuable assistance in the work.

From this time onward to his death in 1854, Mr. Holbrook devoted his whole energies in one way and another to the promotion of these institutions, and to such measures in connection with the cause of education as should promote mutual instruction in children as well as adults. By scientific tracts, by newspapers and other publications, by the manufacture of school apparatus, and by the collection of small cabinets of minerals, to serve as *nuclei* for larger cabinets, by scholars' fairs, by lectures, and long journeys, and by appeals to the members of Congress and of the state legislatures, he succeeded in rousing a powerful and continued interest in the subject of mutual instruction, which, if it did not accomplish all his own plans, at least gave a wonderful impulse to the general intellectual culture of the nation. The lyceums he founded have passed away, at least in their original form, but in their places, and in a great measure as an indirect result of his labors, we have in every considerable town or village debating societies, young men's institutes, mechanics' institutes, library associations—the three latter often with circulating libraries, courses of lectures, and classes for instruction in science, art, and languages, and often with schools attached for the instruction of the children of the members. We have also lecture foundations, either connected with our colleges or professional schools, or independent, in which courses of instruction in physical science, history, literature, or the laws of language, are communicated to popular audiences.

In rendering the scientific lecture a popu-

lar institution, our country is greatly indebted to the late John Griscom, LL.D., Prof. B. Silliman, Sr., and Rev. Henry Wilbur. Dr. Griscom delivered his first course of popular lectures on chemistry in New York city in the winter of 1808; they were largely attended, and were continued for a long series of years. Prof. Silliman commenced popular lecturing on the same subject in New Haven about the same time, in connection with his professional courses. He subsequently delivered popular courses of lectures on chemistry and on geology in most of the large cities of the country. Within the last fifteen or twenty years, Prof. Edward Hitchcock, of Amherst College, and several other eminent geologists, have given courses on geology to popular audiences. Prof. Guyot has lectured on physical geography; Messrs. Mann, Barnard, Page and others, on educational topics; Hon. George P. Marsh on language; Professor Lieber and others on commerce, and other prominent scholars on other subjects. The Lowell Institute at Boston, founded by the munificence of the Hon. J. A. Lowell, gives annually free courses of lectures to large audiences on the most important branches of moral, intellectual, and physical science, and from the liberality of its compensation to the lecturers, induces elaborate and conscientious preparation on their part, and the benefit of this preparation inures also to other audiences, to which these lectures are repeated. It has unfortunately been the custom for a few years past of the young men's institutes, mercantile library associations, and other institutions giving courses of lectures through the winter season, to select lecturers who would amuse rather than instruct their audiences, and hence this mode of public instruction has become gradually less and less efficient, and the chief advantages resulting from these institutions have been the use of their circulating libraries, and their classes of instruction and debate. A revolution, however, is now gradually taking place in this respect; lectures on physical science are more frequently incorporated in the courses, and the highest talent is employed in the illustration of these sciences. The lectures of Professors Doremus, Draper, and Silliman, jr., on chemistry; of Mitchel, Youmans, and Loomis on astronomy, and of Agassiz, Henry, and others on geology, have uniformly attracted large audiences, and have led to the study of these sciences.

The Smithsonian Institution, which combines some of the features of the lyceum, in its public lectures, classes, and museum, with its other objects, will be spoken of at length in another place. Its influence in promoting scientific research has been widely felt.

One of the noblest enterprises connected with this class of institutions is the Cooper Union of New York city. The founder with princely liberality has erected an immense building, occupying an entire block, of the most substantial character. A portion of this building is rented, and the proceeds of the rental go to sustain a free reading-room as extensive as any in the country, a picture gallery, a library, schools of design for male and female pupils, and classes for instruction in sciences, the mechanic arts, and languages, all of which have rooms and instruction free, under the most competent teachers. Courses of lectures on scientific subjects for the working classes also form a part of the plan of Mr. Cooper.

Mr. George Peabody has also made a most liberal endowment, amounting in all to about \$600,000, for an institution at Baltimore, to include a public library, courses of lectures on science, art, and literature, prizes for scholarship in the high schools, an academy of music, and a gallery of art.

The number of institutions coming under the general head of lyceums in the United States, is very great; throughout the Northern states every city and every considerable town has some organization of the kind, all of them having their courses of lectures, and most of them debates, essays, readings, or classes of instruction. To them is attributable in no inconsiderable degree the very general prevalence of oratorical talent in our country, and that ability for impromptu argument and discussion, the faculty of "thinking on our legs," as an English writer not inaptly terms it. While much of the instruction communicated by lectures must necessarily be superficial, and is often wanting in accuracy, it cannot be denied that they have contributed much to the diffusion of general information and culture.

CHAPTER XXI.

INSTITUTIONS FOR THE INSTRUCTION OF THE DEAF AND DUMB.

THE capacity of the deaf-mute to receive instruction was not generally acknowledged

anywhere till the latter part of the last century. Individual instances of education of those laboring under this infirmity had indeed occurred as early as the middle of the 16th century, and perhaps even at a still earlier date, but no considerable attempts had been made to instruct them previous to the efforts of Pereira, Heinicke, De l'Épée, and Braidwood, all of whom taught deaf and dumb pupils, between 1742 and 1760. Of these, Heinicke and De l'Épée alone are deserving of the honor of being reckoned the founders of a great philanthropic movement. The former attempted the instruction of deaf-mutes by teaching them to articulate; the latter by the manual alphabet, and a development of the natural language of signs. De l'Épée's processes were greatly improved by the Abbé Sicard, and Bebian, a pupil of Sicard.

Deaf-mute instruction was not attempted in this country till about the year 1816. In a few instances children of wealthy parents, suffering under this infirmity, had been sent to England for instruction by the Braidwoods, father and sons, who held in their own family the monopoly of deaf-mute teaching, though adopting substantially the processes of Heinicke, and who charged a very high price for the education of each pupil. The father of one of these American pupils, in a work entitled "*Vox oculis subjecta*," published in 1783, lauded in high terms the instruction of the Messrs. Braidwood.

In 1814, Rev. Thomas H. Gallaudet, a young clergyman of Hartford, Conn., became deeply interested in the case of Alice Cogswell, the little daughter of Dr. M. F. Cogswell, a neighbor of his, who had lost her hearing in infancy, and having devoted much thought and investigation to the subject of the number and condition of the deaf-mutes of that state, was desirous of doing something for their education. Dr. Cogswell and other benevolent gentlemen in Hartford furnished the means of sending him to England, to learn the art of teaching deaf-mutes, and he sailed from New York for Liverpool, May 25, 1815. Arrived in England he found the elder Braidwood dead, and the mother, sons, and other relatives, who had now established three schools, unwilling to enlighten him as to their processes, unless he would pay 1500 dollars, remain a year as an assistant in one of their schools, and take the grand-

son of the first Braidwood, a drunken vagabond, as a partner in the institution to be established in America. Rejecting these terms, as unworthy of the pioneers in a great benevolent enterprise, Mr. Gallaudet had almost determined to return home, when he met the Abbé Sicard in London, and was most cordially invited by him to come to Paris and acquire his methods of teaching, receiving from him the necessary private instructions to enable him to accomplish this object more rapidly. This generous offer was promptly accepted by Mr. Gallaudet, and after three months of close application he returned to America, bringing with him M. Laurent Clerc, an educated deaf-mute, and one of Sicard's most successful teachers. It was now determined to establish a school for deaf-mute instruction, as soon as the necessary funds could be obtained. For this purpose, Messrs. Gallaudet and Clerc travelled extensively through the Eastern and Middle states, everywhere receiving a warm welcome. In the spring of 1817, about \$12,000 had been contributed and pledged, to which the Connecticut legislature subsequently added \$5000 more.*

The school was opened in rented buildings, April 15, 1817, having been chartered in May, 1816, by the legislature under the name of "The Connecticut Asylum for the Deaf and Dumb." An application was made to Congress for a grant, as it was supposed, in the general ignorance concerning the number of deaf-mutes, that one asylum would be sufficient for the whole country, and that body donated a township of land in Alabama, which, under wise and careful management, has produced a fund of over \$300,000, the interest of which is applied to the reduction of the annual expenses of the institution, and enables the directors to furnish board and tuition to their pupils at the low price of \$100 per annum. After the reception of this grant, the name of the institution was changed to "The American Asylum for the Deaf and Dumb."

Thomas Braidwood, the grandson of the founder of the first English school for deaf-mutes, to whom we have already referred, had come to Virginia as early as 1811, and had attempted to establish there a school for the deaf and dumb, but his habits were

* This sum was a few years later expended by the Asylum in the education of indigent deaf-mutes natives of Connecticut.

such that all the assistance offered him was of no avail, and after a time he returned to England; Mr. Gallaudet's efforts incited the family to make another trial, but he was so thoroughly a vagabond, that it again proved unsuccessful. M. Gard, a teacher of deaf-mutes at Bordeaux, and himself a deaf-mute, also offered to come to New York, in 1816, and establish an institution there, on the plan of Sicard, but the project fell through.

Meantime, philanthropic persons in New York city were desirous of establishing an institution for the benefit of the deaf-mutes of the city and state, and an act of incorporation for such an institution was passed on the 15th of April, 1817, the same day that the school at Hartford was opened. Among the most active promoters of this enterprise were Dr. Samuel Akerly, Dr. Samuel L. Mitchell, De Witt Clinton, Silvanus Miller, Peter Sharpe, and Rev. James Milnor, D.D.

The course of the American Asylum at Hartford was prosperous from the first. Mr. Gallaudet was a man of genius, and possessed the ability to originate and carry into effect new methods of instruction, and to modify the processes in use in the French schools. In these measures he was efficiently seconded by M. Clerc, and by a corps of young but able teachers whom he had gathered around him, and imbued with his spirit. Prominent among these teachers were Messrs. William C. Woodbridge, Lewis Weld, Harvey P. Peet, Isaac Orr, and William W. Turner.

The New York Asylum had adverse fortunes to contend with at first. It was opened in May, 1818. Its first principal was Rev. A. O. Stansbury, who had been for a few months previous the steward of the American Asylum, and was but imperfectly qualified for his duties; the greater part of the pupils were day scholars, and attended irregularly; the assistant teachers were half-educated deaf-mutes; an attempt was made to teach articulation, but it proved a failure. Mr. Loofborrow, who succeeded Mr. Stansbury in 1821, possessed intelligence and energy, but he had few competent assistants, and the state legislature which had made appropriations for the support of deaf-mute pupils, was becoming dissatisfied with the condition of the institution, as compared with those at Hartford and Philadelphia. In 1830, an entire change was effected. The asylum was located on Fiftieth street, where

buildings were erected for it; day scholars were no longer admitted; the inefficient teachers were dismissed, and Mr. Harvey P. Peet, then one of the ablest of the teachers in the American Asylum, elected principal. Mr. Peet entered upon his duties in February, 1831, and though at first compelled to perform all classes of duties, his genius, tact, and indefatigable labor soon brought order out of chaos, and enabled him to place the institution in the very first rank. In 1853, the property of the institution on Fiftieth street was sold, the buildings being too small for the accommodation of their pupils, and being subject to encroachment from the rapid increase of population in their vicinity. A new location, comprising 37 acres, was purchased on Washington Heights, about nine miles from the City Hall, and overlooking the Hudson river. On this site a magnificent building has been erected, much the finest and most perfect in its arrangements of any asylum for deaf-mutes in the world. It has cost, including the grounds, nearly \$600,000, and will accommodate about 500 pupils. Mr. (now Dr.) Peet is still at the head of it, and his eldest son, Mr. Isaac Lewis Peet, is the efficient vice principal.

The Pennsylvania Institution was founded at Philadelphia in 1820, by David Seixas and Mr. Lewis Weld, one of the teachers at the American Asylum, became its principal in 1822. In 1830, Mr. Gallaudet resigned the charge of the American Asylum, and Mr. Weld was elected his successor, and was followed at Philadelphia by Mr. Abraham B. Hutton, who had been one of the teachers of the institution. This school has enjoyed continuous prosperity. The Kentucky School is located at Danville, and was founded in 1823. Mr. J. A. Jacobs, who is still at its head, was its first, and has been its only principal. He, too, had previously been a teacher at the American Asylum. It has a moderate endowment arising from the sale of lands granted to it by Congress. The Ohio Institution was established in 1829, and has had three principals—Messrs. Hubbell, Cary, and Stone. The first and last were from Hartford, the second from the New York Institution. The Virginia Institution, organized at Staunton, was the first in this country which combined the instruction of deaf-mutes and the blind in one institution. Such a combination is not uncommon in Europe, and five other asylums

ALPHABET OF THE DEAF AND DUMB.





AMERICAN ASYLUM FOR DEAF AND DUMB, HARTFORD, CONN.

have followed the example in this country. The best authorities, however, regard the plan as objectionable in many respects.

The other institutions for the instruction of deaf-mutes (there are in all twenty-three) have been organized since 1844. Most of them are state institutions, and though generally well managed, partisan politics have, in some instances, materially impaired their efficiency and usefulness.

Provision has been made, in nearly all the states, for the education of the indigent deaf and dumb, so that no person of suitable age, suffering from this infirmity, need go uninstructed, if they, or their friends, will apply to the state authorities; yet of the nearly 3000 deaf-mutes of school age in the United States, but about 2000 are under instruction. The greatest deficiency, however, is in the new states, and will be remedied in the course of a few years.

The term of instruction varies from six to ten years. Seven years is the usual term in most of the states; but in the American Asylum, the New York Institution, and, we believe, the Pennsylvania Institution, a high class has been established, into which those who give evidence of superior abilities, and desire for higher scholarship, are admitted by examination, and pursue an additional course of three years. The course of study, including this period of three years, em-

braces the topics of a very thorough English and mathematical education. Other languages than English are not usually taught. From these classes most of the deaf-mute teachers are now drawn.

The intellectual and moral condition of uninstructed deaf-mutes is one of extreme, almost rayless ignorance. Careful inquiry in some thousands of cases has demonstrated that, unless communicated by friends versed to some extent in the language of signs, they have no idea of a Supreme Being, of the origin of the objects of nature, of their own possession of a soul, of death, or a future existence. The mind is almost a blank, and the few thoughts they possess are merely such as concern their food, drink, and rest, and the objects with which they are constantly brought in contact. It is obvious, then, that the mental condition of a child of ten or twelve years of age, deaf from birth, and consequently dumb, is below that of a child of three years who can hear and speak. The child who possesses all its faculties has, before entering school, acquired a very considerable fund of ideas, and the words for their intelligent expression; so that the teacher has comparatively little occasion to communicate ideas to him, except on topics connected with his studies, and these he can clothe in words which the child already understands.

In the case of the deaf-mute, on the other hand ideas, even on many common and simple subjects, must be first communicated to him, and that not in words, for as yet these are entirely incomprehensible, but in the language of pantomime and gesture. He is next to be made to comprehend the laws of construction and connect words, either written, or spelled by the manual alphabet, with the ideas already acquired (a long and painful process,) and then, through the two *media* of words and signs, to be taught the elements of science.

The system of Heinicke and the Braidwoods, a system still, with some modifications, taught in Germany and some other European countries, had for its basis the dogma that ideas could only be expressed or communicated by means of words; and hence with great difficulty and pains, even in the flexible German tongue, the deaf-mute was taught to articulate words, whose meanings he did not understand, and then, as step by step he connected ideas with the simplest of them, these were made the means of conveying to him the meaning of those more abstract and difficult. In this way three or four years were consumed before the pupil was prepared to acquire the facts of science, or the knowledge of his moral obligations.

The plan of De l'Épée, modified by Sicard and Bebian, had little in common with that of Heinicke. Their fundamental principle was, that "words have no natural or necessary connection with the ideas of which they are the signs, and that in the natural language of signs or pantomime, improved and enlarged as it can be, there is a complete substitute for them." No attempt was made at teaching articulation, but words were taught by means of signs, and these once acquired, were made the medium of further instruction by ordinary text-books. In order to teach words more readily, M. Sicard introduced what he denominated *methodical signs*, that is, a peculiar gesture for each word, which the pupil was taught. It is obvious that if the vocabulary of the deaf-mute was to be as large as that of ordinary intelligent speaking persons, the number of these arbitrary signs (for it is to be understood that these differed almost as much from the ordinary signs as the latter from words, the natural signs representing ideas, and the methodical signs single words) must be very great, some thousands at least, and

to retain them in memory was a very fatiguing task for both pupil and teacher.

The American system of instruction of deaf-mutes differs materially from both the preceding, and this difference originated partly with Mr. Gallaudet and the teachers trained up under him, and is partly the result of the experience and observation of the eminent teachers who have been, and still are, engaged in deaf-mute instruction.

In establishing the American Asylum, Mr. Gallaudet combined the principle of Heinicke, of the connection of ideas with words, with that of De l'Épée, that the natural language of signs must be elevated to as high a degree of excellence as possible in order to serve as the medium for giving the ideas clearly and explaining them accurately; but he added to these another which had never before been applied to deaf-mute instruction, viz., that the process of learning words might be greatly facilitated by leading the pupils to reflect on their own sensations, ideas, and mental processes. With the earliest lessons he imparted in the names of sensible objects, he was accustomed to endeavor to open communication with them, by means of the sign-language, in regard to the feelings and emotions excited by these objects, and, if possible, to connect them with something in the pupil's past experience. From this, the deaf-mute was naturally led on to think of the feelings and emotions of others, thence, by a natural transition, to the idea of God as a Creator and benefactor, and finally to a knowledge of his law, and the final destiny of man. The result of this has been that pupils in this country (for this plan has been generally adopted in our American institutions) are made acquainted with the simple truths of religion and morality in one year, a period in which, in the European institutions, they have scarcely advanced beyond the knowledge of sounds and the names of sensible objects, qualities, and actions, or the most common phrases. Apart from the high religious importance of this process, it brings moral motives to bear earlier, and renders the government of the pupils easier, while it aids them in the formation of correct habits. The conducting of the daily and weekly devotional exercises in the sign-language was another peculiarity introduced by Mr. Gallaudet.

Methodical signs were used to a considerable extent by Mr. Gallaudet and the earlier instructors of American institutions, but were

not regarded as so indispensable by them as by the French teachers. Of late years they are less employed than formerly, and are made to indicate phrases rather than words, while the manual alphabet is regarded as of more value in teaching than it was thirty years ago. An advance has also been made, of great importance, by the introduction, by Mr. I. Lewis Peet, of the New York Institution, of manual and written symbols for those ultimate constituents of the sentence which form so considerable a portion of spoken and written language. By this means written language is taught with much greater facility than formerly. The establishment of high classes has also been an important step in the progress of deaf-mute education, furnishing, as it does, the deaf and dumb the opportunity of attaining to as high intellectual culture as those enjoy who are in the possession of all their faculties.

In 1850, the number of deaf-mutes in the United States was 9803, or one in 2345.

Some of the educated deaf and dumb in this country have attained to considerable distinction. Laurent Clerc, the companion of Gallaudet, belongs by his birth and education rather to France than America, yet he has passed more than forty years in this country, and though now retired in a healthful and happy old age, from active duty, is deservedly esteemed and honored. Thomas Brown, the President of the American Association of Deaf-Mutes, is a vigorous and able writer, as are also John T. Burnett and James Nack. The latter has distinguished himself as a poet of no mean ability, and the former has been a frequent and welcome contributor to several of our ablest reviews. Mrs. Mary Toles Peet, the wife of the accomplished vice principal of the New York Institution, though young, is entitled to a very high rank among the most gifted of our female poets. Colonel David M. Phillips, of New Orleans, in spite of his infirmity, was for many years one of the most accomplished military officers of the South. John Carlin, as an artist, and Albert Newsam, as an engraver, have few superiors in their respective professions. The monument to Mr. Gallaudet, designed by the former and engraved by the latter, is one of the most admirable and appropriate monumental structures. Mr. Levi S. Backus was for several years the able and successful manager of a periodical in central New York.

We present a table of the deaf and dumb institutions of the country, with their statis-

tics to the present year (1860). There is also a deaf-mute institution in California, and one erecting at Faribault, Minnesota.

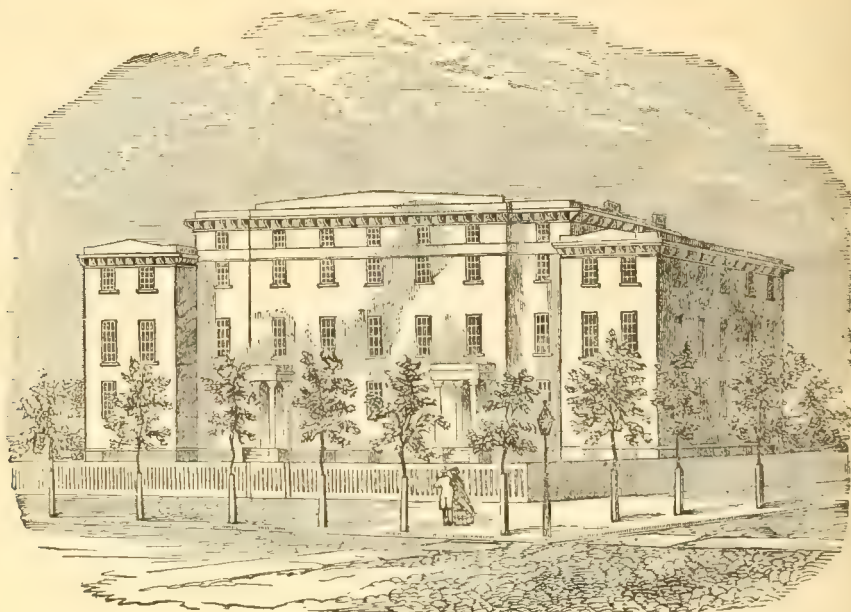
CHAPTER XXII.

INSTITUTIONS FOR THE INSTRUCTION OF THE BLIND.

THE instruction of the blind had never been attempted on any considerable scale, in any part of the world, till Valentin Haüy, in 1784, commenced in Paris, France, his school for blind pupils. Individuals who were blind had indeed educated themselves by the assistance of friends; but the great majority of those who suffered from this affliction were left to a life of dependence and depression, and often became beggars. The efforts of Haüy, and his invention of an embossed alphabet, to enable the blind to read, led to the foundation of a school for the blind, supported by the French government, in 1791, and to the organization of similar schools in England, Prussia, Austria, and Russia about the same period. In these schools, reading and music, and some of the simpler mechanic arts, such as knitting, mat-weaving, basket-making, etc., were taught.

The first attempts to establish schools for the blind in this country were made about 1830. Dr. J. D. Fisher, in 1829, obtained an act of incorporation for an institution for the instruction of the blind from the Massachusetts legislature, and in 1831 Dr. Samuel Akerley and Mr. Samuel Wood, a benevolent merchant in New York, in conjunction with some other gentlemen, made an application to the New York legislature for a similar act, which was granted. Soon after this movement was made, Dr. John D. Russ, who had just returned from a mission to Greece, whither he had borne the contributions of American citizens to the suffering Greeks, and who on his way home had visited some of the European blind institutions, identified himself with it, and eventually became the principal of the school for the blind in New York city, which was established in 1832, under the charter already named.

In Boston, Dr. Samuel G. Howe, who had also been actively engaged in the cause of the Greeks, and who, like Dr. Russ, had visited the European institutions for the blind, entered with great zeal upon the work of establishing a school for their instruction,



PENNSYLVANIA ASYLUM FOR THE BLIND.

and made a beginning, we believe, under Dr. Fisher's charter, in 1832. The liberal gift, by Colonel T. H. Perkins, of his valuable mansion house in Pearl street, Boston, to this school, on condition of the raising of \$50,000 by the public, soon secured to the institution a liberal endowment.

The year succeeding, an institution for the blind was established in Philadelphia through the efforts of Messrs. Roberts, Vaux, and others, at the head of which was placed an intelligent and philanthropic Prussian, Mr. Julius Friedlander, who had been engaged in teaching the blind at Berlin, under the celebrated Zeuné.

The first efforts of the American instructors of the blind were devoted to the improvement of the alphabet of raised letters, used in printing for the blind, with a view to the preparation of books for them. There were considerable difficulties to be overcome in the accomplishment of this work; the letters must have salient angles; each letter must differ sufficiently from every other to be easily recognized by the touch; yet the size of the letters must be small, or the books printed for the blind would be too cumbersome and expensive. The forms of letters used in Europe did not answer these requirements satisfactorily. Haüy's type, if well embossed, could be read with tolerable facility, but it

was much too large, and its size could not be reduced without impairing its legibility; Guillié's was not legible at all; Gall's varied too much from the ordinary form of letter to be desirable, and the other attempts at uniting the requisite qualities failed. Each of the three American superintendents devoted his leisure to the work. Mr. Friedlander devised an alphabet, known in England as the Allston or Sans-serif Alphabet, neat in form and easily read, but somewhat too large. Dr. Russ invented one combining the advantages of Gall's triangular alphabet with the Illyrian letter, and with characters to make it phonetic, but it was somewhat defective in legibility; and Dr. Howe, after repeated trials, constructed what is now known as the Boston letter, which in size, distinctness, and legibility so far surpassed every previous effort, that it has now come into general use in Europe and America. Two other subjects interested these American pioneers in the work of instructing the blind: the recognition by the state legislatures of the right of blind youth to the advantages of an education, and the extension of the course of study so far as to give their pupils a good English education, instructing them, at the same time, in such mechanic arts as might enable them to support themselves after leaving the institution.

At the time of the organization of these

schools, the institutions for the blind in Great Britain, and most of those on the continent of Europe, taught nothing but reading and the mechanic arts, except in the case of those who possessed musical talents, who received such instructions in music as would enable them to play upon the piano or organ, and to sing; but the ordinary branches of elementary education were entirely neglected. The American superintendents determined that their pupils should receive a good common-school education, and if possible something beyond this, and they have succeeded. The period of instruction varies in the institutions for the blind in the United States from five to eight years. In the larger and older institutions it is usually eight years, and includes a course of mathematics and belles-lettres as extensive as that in most of the colleges in the country, and a thorough course of musical training, both vocal and instrumental. The languages are not usually taught. There are now twenty-four of these institutions in the United States. The Ohio Institution at Columbus was founded in 1837, and that of Virginia at Staunton in 1839; the others have all been organized since 1842. To all these establishments there are attached work-rooms, in which the pupils are employed in the manufacture of mattresses, mats, baskets, paper boxes, brooms, brushes, or the simpler articles of cabinet work.

To many of the blind, music furnishes not only a recreation but a means of support. Their ear, long trained to the discrimination of sounds, and their touch, rendered delicate by the acquisition of the art of reading, give them peculiar facilities for the attainment of musical skill; and the concentration of their minds upon it, undisturbed by observation of what is passing around them, adds to their advantages. It is not, therefore, remarkable, that many of them should have attained to great eminence in musical science. The Pennsylvania Institution has been specially remarkable for the musical attainments of its pupils. Its weekly concerts are attended by from 1200 to 1500 of the music-loving inhabitants of that city, and the receipts from these concerts furnish a liberal fund to aid the poorer graduates in commencing an independent life. Many of these pupils find speedy and remunerative employment as organists, choir singers, members of orchestras or bands, or piano-teachers and tuners.

The great cost of printing books for the

blind has rendered the supply scanty and the number of books small. The American Bible Society has printed an edition of the Scriptures in the Boston letter, and grants are made from time to time to institutions for the blind. The American Tract Society has also printed a few of its smaller books in the same letter. Aside from these, there are not more than fifty works printed for the blind in England and America, except a few in arbitrary characters, which of course are of no general value. Among these fifty is a cyclopedia to be completed in twenty volumes, but of which only eight or nine have yet been issued. Repeated applications have been made to the general government to make an appropriation either of money or lands, to furnish a fund for the establishment of a press for the blind, but the bills reported have always been defeated. Within the past year a "Printing House for the Blind" has been established at Louisville, Kentucky, endowed in part by private benefactions, and in part by appropriations from the several states. Its managers propose to go on in the manufacture of books for the blind, using the Boston letter, and making grants to the blind of each state in a ratio corresponding to the amount contributed by that state.

Owing in part to this paucity of books the educated blind seldom use the books in the raised letter subsequent to their graduation, except the Scriptures, but depend mostly upon the reading aloud of others for their information and instruction.

Writing has always been a difficult and irksome task to the blind; and various devices have been proposed to facilitate this labor, but hardly any of them have proved satisfactory. The plan adopted by the late William H. Prescott of using a frame of wires over the paper, enabled them to write in straight lines, but no corrections could be made, nor could the scribe read what he had written. The use of inks which would leave an elevated surface has been tried, but without much satisfaction; small printing machines have also been used, but are not convenient.

Within a few years past another process has been introduced, which, despite the apparent objections to it, proves far more serviceable and convenient than any other yet devised. By this invention, known as "Braille's system," from its inventor, M. Louis Braille, a French teacher of the blind,

they are soon enabled to read and write with great facility, and by the addition of a single character, music can be printed or copied by the blind far more readily than a seeing person can do it in the ordinary way. The plan is based upon a series of fundamental signs, comprising the first ten letters of the alphabet; none of these consist of less than two nor more than four dots. A second series is formed by placing one dot at the left of each fundamental sign; a third by placing two dots under each sign; a fourth by placing one dot under the right of each. These signs designate, besides the alphabet, the double vowels, peculiar compound sounds like *th*, and the marks of punctuation. By prefixing a sign consisting of three dots, the fundamental signs are used as numerals; by prefixing another the last seven represent musical characters, and by a sign peculiar to each octave the necessity of designating the key to each musical sentence is avoided.

The apparatus consists of a board, in a frame like that of a double slate, the surface of which is grooved horizontally and vertically by lines one eighth of an inch apart; on this the paper is fastened by shutting down the upper half of the frame, and the points are made with an awl or bodkin, through a piece of tin perforated with six holes, an eighth of an inch apart. The perforations are made from right to left, in order that the writing when reversed may read from left to right. Books and music are now printed for the blind on this system. Five or six of our larger institutions have adopted it.

Some of the blind institutions in this country have attached to them workshops for the adult blind, especially those who have graduated at these institutions, where certain advantages of shop-rent, machinery, material at wholesale prices, and in some instances board at a reduced rate, or a moderate pension, are allowed, by way of equalizing the difference between them and the working classes who possess all their faculties. In one instance, in Philadelphia, an asylum has been provided for the aged and infirm blind, where, beguiling the weariness of the passing hours by such light toil as they can readily accomplish, they may pass the evening of life in comfort and happiness.

The ratio of the blind to the entire population was, according to the last census, 1 to 2328, which would give not far from 13,000 as the present number in the country. Estimating one fifth of these as of school age,

there should be 2600 in the different institutions. The number actually connected with them does not exceed 1300. As most of the states have made provision for supporting poor blind children at these institutions, a provision available on application to the governor or secretary of state, this number should be largely increased.

We have the testimony of some of the most eminent European teachers of the blind, that our larger institutions are superior to any of those in Europe in the thoroughness and extent of their teaching, and in the spirit of self-dependence with which they inspire their pupils. We insert a table giving a view of the present condition of the blind institutions in this country so far as can be ascertained. There is also an institution for the blind incorporated in California.

CHAPTER XXIII.

INSTITUTIONS FOR THE TRAINING OF IDIOTS.

THESE belong to the class of humanitarian efforts which have become so numerous during the past hundred years, and which have embraced in their scope the infirm, the orphan, the unfortunate, the vicious, and those who, from deprivation of one or more of their faculties, or feebleness of all of them, have become dependent upon others.

An effort is said to have been made by Vincent de Paul, one of the noblest and purest men in the Roman Catholic Church, more than two hundred years ago, to instruct a few adult imbeciles at the priory of St. Lazarus, in Paris, but with very slight success. The attempt was not repeated till 1818, when an idiot child, dumb from idiocy, was admitted as a pupil at the American Asylum for the Deaf and Dumb at Hartford. He was considerably improved during a residence of a year there; but not being properly a deaf-mute, and not being capable of going on with their classes, he was dismissed. He had, however, learned the sign-language sufficiently to be able to communicate his wants by it. Other imbeciles were subsequently, at various times, admitted to that and some other institutions for the blind and for deaf-mutes in this country prior to 1840. Most of these received some benefit from incidental instruction and intercourse with the pupils of these institutions. In Great Brit-

ain, as early as 1819, Dr. Richard Poole, of Edinburgh, published an Essay on Education, in which he urged the importance of attempting to educate and improve idiot children, and called for the organization of an institution for imbeciles. Efforts were made in France, from 1824 to 1838, by several eminent men, to instruct a few of these unfortunates, but with comparatively slight success. They were taught to imitate others in a few motions, and to repeat a few words by rote, but, left to themselves, soon relapsed into their previous hopeless condition. In 1838, Dr. Edward Seguin, a friend and pupil of the celebrated surgeon Itard, who had himself long contemplated the possibility of idiot instruction, commenced teaching a few idiot children in Paris. Unlike those who preceded him in this work, he had studied carefully, in all its bearings and relations, the subject of idiocy; and having become satisfied that it was only a prolonged infancy, in which the infantile grace and intelligence having passed away, there remained only the feeble muscular development and mental weakness of that stage of growth, he sought to follow nature in his processes for the development of the enfeebled body and mind. In these efforts he was far more successful than his predecessors. In 1846, he published his treatise on the Treatment of Idiocy, which is still the text-book of all teachers of imbeciles.

About the same time that Dr. Seguin commenced his school in Paris, a young Swiss physician of Zurich, Dr. Louis Guggenbühl, attempted with success the training of some Cretin* children, on the Abendberg, above Interlachen. The success of these two philanthropists led others in Prussia, Austria, the smaller German states, Sardinia, and England, to establish similar schools for the training of these hitherto neglected children.

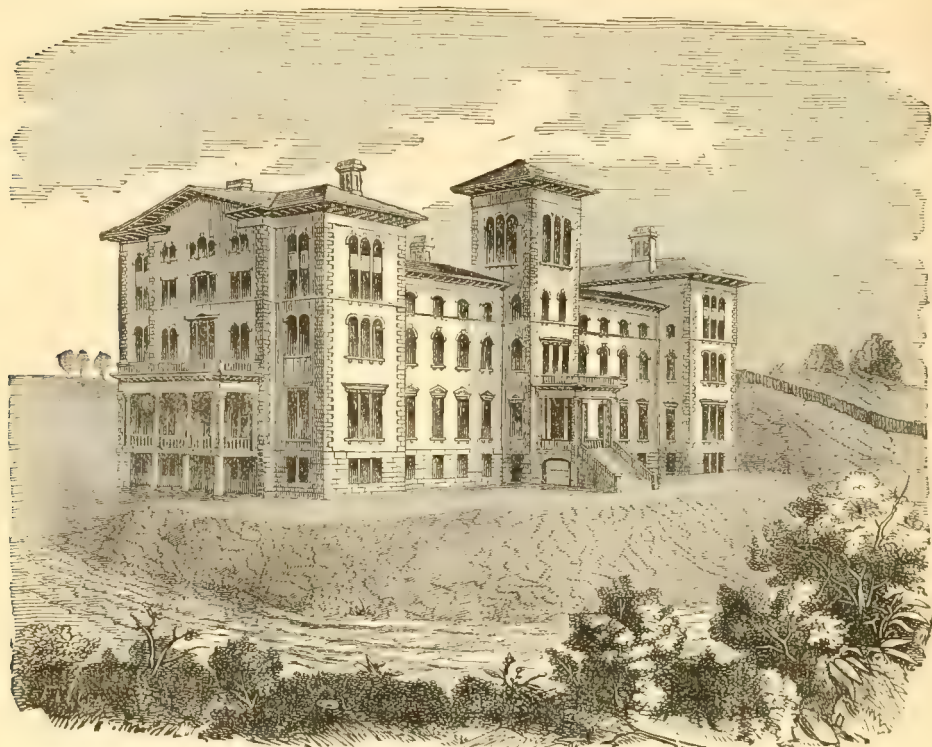
The first movements for idiot training in this country were made almost simultaneously in New York and Massachusetts; that in New York having slightly the precedence, though the first schools were organized in Massachusetts. Dr. F. F. Backus of Rochester, elected to the state Senate of New York in the autumn of 1845, had become

interested in the accounts of the schools of Seguin and Guggenbühl, and informing himself as fully as possible in regard to them, made a report to the Senate, in the session of 1846, accompanying it with resolutions providing for the establishment of a training school. These passed the two Houses, but were reconsidered and lost in the lower House. During the same winter, on the motion of Judge Byington, in the Massachusetts legislature, a commission was appointed, consisting of the mover, and Dr. S. G. Howe and Gilman Kimball, Esq., to investigate the condition of the idiots and imbeciles of the state. In 1848, as a result of the reports of this commission, the Massachusetts School for Imbecile and Feeble-minded Youth was chartered, but was not organized till October of that year. It is under the general superintendence of Dr. S. G. Howe. Meantime, in July, 1848, Dr. H. B. Wilbur, a young physician of Barre, Mass., had opened a private school for imbecile and backward children in that town. In 1851 an experimental Asylum for Idiots was established at Albany, N. Y., and Dr. Wilbur was appointed its superintendent. Three years later, this gave place to the New York State Asylum for Idiots at Syracuse, for which the state erected a noble edifice, and provided for the training of the indigent imbecile children of the state. In 1852, the Pennsylvania Training School for Idiots and Imbeciles was organized at Germantown, Penn.; but in 1859 it was removed to Media, Penn., where a large and well-provided asylum has been erected for it. It is under the care of Dr. Joseph Parish. In 1857, the Ohio State School for Idiots was established at Columbus, and Dr. R. J. Patterson took charge of it. The original school at Barre passed into the hands of Dr. George Brown when Dr. Wilbur removed to Albany, and still maintains its early efficiency. Besides this, there are two other private schools for imbeciles: one in New York, under the charge of Mr. J. B. Richards, who was formerly connected with the Massachusetts and Pennsylvania institutions, and one in Lakeville, Litchfield county, Conn., under the care of Dr. H. M. Knight, established in 1858.

Several of the other state legislatures have agitated the subject, and will, probably, eventually establish schools.

Of those already in existence, the asylum in Syracuse, of the state institutions, and that at Barre, of the private ones, have been the

* The Cretin is an imbecile whose physical degeneration is greater, though his mental condition is more hopeful, than that of the idiot. The disease, Cretinism, is supposed to be caused by the impregnation of the springs with magnesian salts, and is very common in mountainous districts.



ASYLUM FOR IDIOTS, SYRACUSE.

most successful, and, in the opinion of competent and unprejudiced judges, are superior to any of the European institutions. Dr. Seguin, the founder of the Paris school, has been in this country much of the time for twelve years past, and has rendered efficient service in the introduction of the best methods of instruction.

The processes employed in the training of idiots in our American institutions all grew out of Seguin's fundamental theory, "that idiocy is a prolonged infancy;" and the course pursued by nature in developing the infant into the healthy, robust, intelligent child, is closely followed. In many cases, the muscular system is feeble, and unequally and imperfectly developed; this is carefully invigorated by attention to diet, frequent bathing, and such exercise as shall strengthen the muscles, while subordinating them to the control of the will. The attention is fixed, and taught to distinguish form, size, and color by the presentation of objects of bright colors, and of varied form and bulk. The irregular muscular movements, often the result of habit, are controlled by gymnastic

exercises with dumb-bells, ladders, etc., and by military exercises, which exact the attention and careful action of the hands, feet, head, and eye. Numbers are taught by the *object* method, and reading by the *word* system and the use of pictures. As in deaf-mute instruction, the effort is made, at the earliest possible moment, to direct the thoughts inward, to lead the child to watch and express his own feelings and emotions, and then to guide him to observe the emotions of others, and soon to learn something of his Creator, and his own moral nature and destiny. It is remarkable with what facility the simple truths of morality and religion are perceived, even by very weak intellects. Their progress in these is much more rapid than in intellectual studies; yet many of the pupils in the best institutions learn to read passably well, to write a good hand, and generally to spell correctly; become familiar with the principal facts of geography, with the elements of grammar, and arithmetic as far, perhaps, as compound numbers. A few make still greater progress, but these are the exceptions, not the rule.

It is, perhaps, too soon to decide very confidently what will be the results of idiot instruction; but this much is tolerably certain, that a proportion not exceeding one fourth, and these often apparently the worst cases when admitted, will become so far improved as to perform the ordinary duties of life and citizenship nearly as well as the masses generally; another fourth will improve so much as to be capable of working intelligently, under the supervision of others, but not of any considerable independent action—these will, under favorable circumstances, nearly or quite support themselves; another fourth will be greatly improved in their habits, and will require but little attention, though unable to do much toward their own support; while the remainder, though often, perhaps, as promising as any at first, will be little, if at all, improved.

The number of idiots and imbeciles in the country has never been satisfactorily ascertained, and in the nature of the case cannot be, from the reluctance of friends, in many cases, to admit their condition. Careful investigations made in some of the states, and in single counties in others, would indicate that here, as in Europe, the number is but little less than that of the insane, or, in round numbers, one in 600.

CHAPTER XXIV.

INSTITUTIONS FOR THE EDUCATION AND TRAINING OF ORPHANS.

SOME of the Roman emperors and many of the bishops and pastors of the early Christian Church interested themselves in the care of orphans, but during the dark ages this as well as other charities was neglected and forgotten, and it was not till the sixteenth century that any attempts were made to establish orphan asylums. During the seventeenth century they became quite numerous both among Protestants and Roman Catholics, and few large towns were without one or more orphan houses. The Moravians in particular were specially tender of the fatherless, and in all their settlements of considerable size established houses for them. In the last years of the seventeenth century, August Hermann Franke established his orphan house at Halle, which still exists, and is one of the largest orphan asylums in the world.

In this country orphan houses were estab-

lished by the Moravians in Pennsylvania and Georgia, early in the eighteenth century. In 1740 the celebrated George Whitefield laid the foundation of his orphan house at Bethesda, about ten miles from Savannah, Georgia. After many pecuniary difficulties it finally attained to a prosperous condition during his life, and he added to it an academy, and purposed, could a charter have been obtained, to establish a college in connection with it.

The number of orphan asylums established previous to the commencement of the present century was, however, very small. There were no very large cities, and it was only in the large cities that orphans unfriended were so numerous as to require considerable buildings for their shelter and domicile. In New York city the first orphan asylum grew out of the "Society for the Relief of Widows with Small Children," and owes its origin to the zeal and energy of the late Mrs. Joanna Bethune. It was founded in 1806, and at first it was attempted to place the children in families, but their number soon rendered this difficult, and after renting premises for a time they erected an asylum in Bank street, and in 1840 removed to their new edifice on the banks of the Hudson, between Seventy-third and Seventy-fourth streets. It is largely endowed.

Subsequently other institutions for orphans have been established in that city, some of them amply endowed either by legacies, or by the increased value of the property on which they were originally erected, while others are dependent, in part, on annual contributions, or on grants from the city treasury or Board of Education. There are now ten of these institutions in New York city and four in the adjacent city of Brooklyn, aside from the Home for the Friendless and other preventive and reformatory institutions, a large part of whose inmates are orphans; and aside, also, from the Randall's Island Nursery, where the last year about 1200 children—orphans, half orphans, or children of intemperate and criminal parents—were cared for. In all these institutions in the city of New York not less than 4000 children are domiciled.

There are now asylums for orphans in nearly every town of 10,000 inhabitants in the country, and in the larger cities there are usually several. Thus there are nine or ten in Philadelphia, three in Baltimore, and five in Boston. One of the most remarkable of

these, both on account of the magnificence of its edifice and the largeness of its endowment, is the Girard College for orphans at Philadelphia. It was founded by the bequest of a tract of land and two millions of dollars by Stephen Girard, a wealthy banker of that city. Mr. Girard left minute directions in his will in regard to the building and management of the charity. It is located on a lot comprising forty-one acres of land, surrounded by a wall ten feet in height. The grounds are laid out as play-grounds, gardens, grass-plots, etc. The buildings are all of marble. The principal one is in the form of a Corinthian temple, 169 feet long, 111 wide, and 97 high, and has a portico of thirty-four marble columns each 55 feet high. One of the smaller buildings is used as a laboratory, bakery, etc. The other four are each 125 feet long, 52 feet wide, and two stories in height. The whole cost of the buildings was \$1,930,000. The officers are a president, secretary, two professors, five male and twelve female teachers, a physician, matron, assistant matron, and steward. The college was opened in January, 1848. As many poor white male orphans as the endowment can support are admitted, between the ages of six and ten years, fed, clothed, and educated, and between the ages of fourteen and eighteen bound out to mechanical, agricultural, or commercial occupations. No ecclesiastic, missionary, or minister of any sect whatever, is to hold any connection with the college or be admitted to the premises even as a visitor. The number of pupils on the foundation is a little over 350, and the annual expenditure about \$60,000.

This is but one of several munificent foundations for orphans in that city. The Burd Orphan Asylum recently founded there for orphans between four and eight years of age, and primarily those of Episcopal parentage, has an endowment of about half a million dollars.

At Zelienople, Butler county, in western Pennsylvania, a farm school for orphans from Lutheran families, was established in 1854, and is under the charge of a superintendent trained to his work in the Institute of Brothers connected with the Rough House, Dr. Wichern's reformatory at Horn, near Hamburg. This is, so far as we are aware, the first distinct effort in this country to train orphan children distinctively to agricultural or horticultural pursuits.

The ordinary course of instruction in most

of these institutions embraces the common branches of English education, and in many of them some mechanical pursuit is taught and practised for four or five hours each day. There is reason to believe that, in many cases, the mode of life and the regularity and formality of the course of training, has too much tendency to render the children *automata*, and unfit them to some extent for the hardships, the frequent changes, and the sudden temptations to which they are exposed after leaving the institutions. Where they are placed in private families while yet quite young, this evil is not so likely to follow as where they are retained, as they are in some asylums, to the age of sixteen.

No estimate, either of the amount permanently invested or of the annual current expenses of these institutions in this country, can be given, nor even any near approximation to an estimate. The permanent investment is to be reckoned by millions, and possibly by tens of millions; the annual expenditure in New York city alone, reaches nearly or quite half a million of dollars.

CHAPTER XXV.

PREVENTIVE AND REFORMATORY INSTITUTIONS.

ALTHOUGH there are occasional indications that individual philanthropists, like the benevolent Cardinal Odescalchi at Rome, and Sir Matthew Hale in England, had clear perceptions of the evil of leaving vagrant and morally endangered children as well as juvenile delinquents, exposed to the temptations to a vicious life, yet apart from a school established partially for them by the former in 1586, there seems to have been no serious movement in their behalf prior to the establishment of the school and home for vagrant and vicious boys at Rome, by Giovanni Borgia, (better known as Tata Giovanni, or Papa John,) in 1786 or 1787, and the organization of the "Philanthropic Society for the Prevention of Crime" at London in 1788. This last, originally established on the family plan, soon became a large establishment, in which a great number of boys were congregated and employed in different branches of manufacture, having also a probationary school of reform for the more vicious and criminal of its inmates. In 1846, the location was changed and the whole system

modified. A large farm was purchased at Red Hill, near Reigate, Surrey, agriculture and horticulture substituted for mechanical and manufacturing pursuits, and the family system for the congregated. Since that period the number of family reformatories, as they are called, has greatly increased in Great Britain. On the continent the eminent success of the agricultural and horticultural reformatories of Mettray, Horn, Ruysselede, and many others of more recent origin, has attracted general attention.

In this country the first institution intended for the reformation of vicious and criminal children, was the "New York House of Refuge for Juvenile Delinquents," incorporated in 1824 and opened January 1, 1825. Its founders were John Griscom, Isaac Collins, James W. Gerard, and Hugh Maxwell, all at the time members of a "Society for the Prevention of Pauperism and Crime," which had been formed in 1818. These gentlemen were aided and encouraged by others whose names appear on the list of incorporators, and who were through life noteworthy for their hearty participation in works of philanthropy. The institution thus founded has had a steady growth, as the rapid increase of population in the city has been attended by a more than corresponding augmentation of the number of juvenile delinquents. At the end of thirty-six years from its first opening it occupies a tract of between thirty and forty acres on the southern end of Randall's Island, in the East River, and its colossal buildings, erected at an expense of not far from \$450,000, furnish ample accommodations for school-rooms, lodging-rooms, dining-rooms, and workshops for 750 children, and actually hold in durance nearly 700.

In 1826 a "House of Reformation," on a similar plan, was established in Boston, and, in 1828, a "House of Refuge" in Philadelphia. Similar institutions have since been organized in New Orleans, Rochester, N. Y., Westboro', Mass., Cincinnati, Providence, Pittsburg, West Meriden, Conn., St. Louis, Baltimore, and perhaps some other cities.

The distinguishing characteristics of these institutions are, that those committed to them have generally been arrested for crime, and have either been sentenced to the House of Refuge, in lieu of a sentence to jail or state prison, or have been sent to these institutions without sentence, in the hope of their reformation. They are supported, di-

rectly or indirectly, from the public treasury (the New York house, besides an appropriation of \$40 per head from the state comptroller, received last year \$8000 from the city treasury, over \$5000 from the Board of Education for its schools, and about \$7500 from theatre licenses). In most, or all of them, the children are employed in some branch of manufacture, or some mechanic art, for from five to eight hours per day, and receive from three to five hours' instruction in school. In all there is more or less religious and moral instruction imparted, having in view their permanent reformation from evil habits and practices. In all, or nearly all, they are confined at night in cell-like dormitories, into which they are securely locked, and their labor, during the day, is under strict supervision, and is generally farmed out to contractors. High walls and a strict police are mainly relied on to prevent escape, and the attempt to do so, or any act of insubordination, is usually punished with considerable though not perhaps unmerited severity. The managers generally possess and exercise the power of indenturing those children who, after a longer or shorter stay, seem to be reformed, even though the period of their sentence has not been completed. A considerable number who have been sent to the House of Refuge on complaint of their parents are, after a time, delivered to them on application; but a large proportion of these do not do well. Of the others, it is believed that from fifty to seventy-five per cent. reform, at least so far as to become quiet and law-abiding citizens. Of those who do not reform, some, after discharge at the end of their term, are soon re-committed; others are sent to sea, and perhaps amid the hardships of a sailor's life become reformed; others return to the vicious associations from which they were originally taken, and after a few months or years of crime, find their place among the inmates of the county or convict prisons, meet a violent death, or fill a drunkard's grave.

These institutions necessarily combine something of the character of a prison with that of the school, and while their main object is the reformation rather than the punishment of the young offender, they retain so many penal features that they are objects of dread and dislike to many parents and guardians whose children or wards would be materially benefited by their discipline.

This feature of their management has led

to the establishment of another class of reformatories which, though sometimes assuming similar names, are essentially different both in the character of their inmates and in the methods adopted for their reformation. These methods are indeed quite diverse in the institutions coming under this general head, and are to some extent the reflection of the differing views of those who have charge of them.

The subjects taken in charge by these reformatories are somewhat younger on the average than those of the houses of refuge; they are for the most part only guilty of vagrancy and the vicious habits of a street life, or at the worst, of petty pilferings and thefts; they have not been, in most instances, tried for any crime against the laws, or if they have, their tender age has justified the magistrate in withholding a sentence.

When admitted to the reformatory, which is usually done on a magistrate's warrant, they undergo a thorough ablation, and are clothed in plain, neat garments having no distinguishing mark, are well fed, and carefully taught and watched over, and the utmost pains are taken to eradicate their evil habits, and to make them feel that their teachers and those who have them in charge are their best friends and seek their good. Their past history is never alluded to, and is generally known only to the superintendent. In these establishments there are no dormitory cells, and severe punishment is seldom found necessary. The labor of the pupils is seldom regarded as a matter of much importance, though in some instances three, four, or five hours a day are spent in some light employment. From these institutions escapes are unfrequent, and in most cases the children form a strong attachment for their teachers. In some instances they are broken up into groups or families of twenty or thirty persons, each having its "house father" and mother, and its "elder brother," if the pupils are boys, and its matron or "mother," and elder sister or aunt, if they are girls. These officers teach them and perform the duties indicated by their titles in such a way as to supply, as far as possible, the place of those natural relations of whose judicious influence they are deprived. One of these reformatories is a ship, and the pupils are taught all the duties required of an able-bodied seaman, and the order and discipline are similar to those of the naval school ships. They are taught, in addition

to ordinary common-school studies, navigation, and after a few months' instruction are in demand for the mercantile marine, where they not unfrequently are rapidly promoted.

In most of these institutions the pupils remain in the reformatory a shorter average period than those who are inmates of the houses of refuge. In the New York Juvenile Asylum, one of the most successful of these reformatories, they are usually indentured or discharged in six or twelve months. In the State Industrial School for Girls at Lancaster, Mass., comparatively few remain over a year. These institutions are usually supported by the large cities, though in a few instances they are state institutions. The labor of the children being of but little account, the expense per head per annum is somewhat greater than in the houses of refuge, but the number of reformations is also greater, and may with considerable certainty be estimated at from seventy-five to eighty-five per cent. Among these institutions we may name the "New York Juvenile Asylum," the "State Industrial School for Girls" at Lancaster, Mass., the "Massachusetts School Ship," the "Asylum and Farm School" at Thompson's Island, Boston, the "State Reform School" at Cape Elizabeth, Maine, the "Reform School" at Chicago, and the "State Reform Farm" at Lancaster, Ohio. In the last, which is the first attempt at the introduction of the family or group system for boys in this country, fruit culture is to be the principal employment of the inmates, and the term of residence will be longer than at most of the others.

In our large cities there is still another class of children for whom a preventive education is necessary; they are not criminal, they have not generally acquired vicious habits, but they are *morally endangered*. They are often orphans or half orphans, and frequently homeless; many of them are children of foreign parents of the lower classes, and have had no opportunities of education; some are the offspring of vicious or intemperate parents. The greater part of them obtain a precarious livelihood by begging, sweeping crossings, boot blacking, selling newspapers, statuettes, fruit, or small wares, or organ-grinding. They are all exposed to strong temptations to evil, and have acquired a kind of defiant independence from being driven so early to take care of themselves.

For these children it has been felt that some provision must be made to prevent

them from falling into vicious and criminal courses, and becoming depredators upon society, and to give them the opportunity of becoming good and intelligent citizens. The measures necessary to accomplish these results have been the subject of much discussion; and amid the experimenting which has been the result of this discussion, much good and some evil have been done. Industrial schools have been established, mainly for girls, in which reading and the elements of geography and arithmetic, vocal music, and the use of the needle in plain work, are taught; and the furnishing of one or two meals a day and plain clothing when needed, are made the inducements to attendance. For the newsboys and other young vendors of petty wares, a lodging house has been opened in New York city, and evening instruction given, the boys paying six cents each for their lodging. On the Sabbath a free dinner is provided for those who will attend and receive religious instructions; evening schools are also established, where those who are engaged in their little employments during the day, may receive intellectual and moral training.

In the worst quarters of New York and Philadelphia, missions and houses of industry have been founded, in which schools are kept through the week, much after the plan of the industrial schools already described, and where homeless forsaken children, and those whose parents are vicious and degraded, are clothed, boarded, instructed, and made to know the comforts of a home. It is obvious, however, that the greatest kindness which can be done to these children is to remove them from the influence of the temptations to which they have been exposed, and hence, most of these institutions send their children to homes in the country, after more or less preparatory training, as fast as good places can be found for them. In many cases, they are adopted by those in whose charge they are placed, and find in their foster parents more tender affection and care than they have ever known before. In other cases, they meet with less sympathy and love, and return to the great city and its temptations again.

In 1853, a "Children's Aid Society" was organized in New York city, mainly through the efforts of Mr. Charles L. Brace, one of whose principal objects is the location of this class of children in good homes at the West and elsewhere. Several of these so-

cieties have since been formed in other large cities. The original society at New York has the oversight of industrial schools, boys' meetings, the newsboys' lodging house, etc., and gathers from all quarters these morally endangered children, and sends them into the country in companies of forty or fifty; its agents having secured situations for them. About 800 are thus sent out annually.

Still another class of organizations intended for the benefit of these hapless children, though devoting its attention mainly to two classes of them, the very young children, infants and children under ten years, and girls of thirteen years and over, who are homeless and out of employment, are the Homes for the Friendless, of which there are now twelve in the United States. The first of these originated with the American Female Guardian Society, in New York, and was the result of the efforts of the directors of that society to rescue these classes from ruin. It assumed its present form in 1847, and has had nearly 10,000 inmates; 683 were received as members of its schools and workrooms in 1859, and 674 were employed in the home workrooms, and furnished with situations; 640 girls were taught in its industrial schools, and 560 families aided.

These institutions are all of them maintained principally by private contributions, though most of them, in the large cities, receive school moneys, to aid in sustaining their schools, from the city or state, and some of them receive occasional grants from the state or city treasuries.

It is impossible to ascertain, with any considerable certainty, the exact percentage of children from these institutions, who eventually turn out well. In most of them, the failures are the exceptions, and the number of these is not large. The Home for the Friendless in New York city keeps up a correspondence relative to each child sent out, until their majority, unless they die before that time. This correspondence demonstrates that full 90 per cent. grow up virtuous and well behaved. This percentage is larger than can safely be predicated of the other institutions, inasmuch as the children are for the most part received into the home at a very early age, and have not acquired the evil habits of those who are older, before coming under the influence of these charities. In the Children's Aid So-

cieties, Houses of Industry, etc., the percentage reformed is large, but not definitely ascertainable.

There is still another class of reformatory institutions not intended for children, but for that unfortunate class of women who, having led lives of unchastity, have become penitent for their sins and desire to return to the paths of virtue. This department of reform has been less actively promoted here than in Europe, and especially in Great Britain, but there are in most of our large cities Magdalen Asylums, or institutions otherwise designated, but intended for this class. New York has one of these asylums, Boston two, and Philadelphia three, one of which, the Rosine Asylum, founded in 1847, is a very active and useful organization.

The number of Houses of Refuge, or institutions of that class, is fourteen. The cost of their buildings and grounds is about \$2,050,000, and the annual cost of their maintenance not far from \$340,000.

Of the Juvenile Asylums, &c., there are seven, the cost of buildings and grounds is not far from \$450,000, and the annual expenses of maintenance about \$130,000.

The number of institutions of the third class cannot be definitely ascertained. Few or none of them are established or entirely maintained by the state or city governments, and some are altogether private enterprises.

There are fifteen of them in the city of New York alone, and two or three in Brooklyn, five or six in Philadelphia, and a considerable number in smaller cities and towns. Some of these occupy leased buildings, others own their edifices.

The buildings and grounds of the New York Home for the Friendless cost nearly \$60,000, and of the Five Points House of Industry, about \$40,000. The annual expenses of seven of the more important of the preventive and reformatory institutions in New York city, were about \$114,000. It would probably be safe to estimate the total permanent investment of all these organizations at not less than three millions of dollars, which we are satisfied is below the reality, and the current annual expenditure at not less than \$750,000.

That these institutions have not yet attained to their highest degree of efficiency, and that they are not fully adequate to the reformation and preventive education of the vast number of morally endangered, vagrant, and criminal children of the country, is undoubtedly true; but among the evidences of national progress in our country since the commencement of its independent existence, there is none which reflects greater credit upon its philanthropy than the establishment and maintenance of so many institutions of reformation and preventive education.

TABLE C. EDUCATIONAL STATISTICS OF THE UNITED STATES IN 1900

STATES AND TERRITORIES.	Colleges.				Academies.				Public Schools.				Private Schools.					
	Teachers.	Pupils.	Annual Income.		Teachers.	Pupils.	Annual Income.		Teachers.	Pupils.	Annual Income.		Returned.	Estimated.	Returned to Country, Ab. or Public.	Returned to Country, Ab. or Public.	Returned to Country, Ab. or Public.	Returned to Country, Ab. or Public.
			Returned.	Estimated.			Returned.	Estimated.			Returned.	Estimated.						
Alabama.....	5	55	567	\$41,255	\$14,530	166	380	8,290	\$64,165	\$224,279	1,152	1,195	98,840	\$315,602	\$300,640	37,237	62,778	33,757
Arkansas.....	3	14	150	3,100	3,100	6	126	2,497	27,937	34,308	353	355	8,433	43,763	68,111	11,050	23,530	16,819
California.....	2	218	2,400	24,000	24,000	6	126	170	14,270	84,040	22	31	40	14,300	14,700	239	982	5,118
Colorado, Dist. of.....	36	218	2,400	24,000	24,000	292	320	3,233	84,040	84,040	22	1,747	2,169	21,232	23,252	4,720	6,103	1,457
Connecticut.....	2	56	738	53,639	53,639	407	320	6,966	134,967	132,120	1,656	1,741	71,392	271,220	231,220	79,005	142,339	42,739
Delaware.....	2	16	144	17,200	17,200	65	94	1,251	33,937	53,498	194	214	8,370	43,801	43,801	11,125	14,216	4,536
Florida.....	13	84	1,335	105,430	105,430	219	318	9,065	108,943	92,742	69	1,915	32,705	162,321	190,255	33,209	77,015	41,200
Georgia.....	6	35	442	13,300	15,359	83	160	4,244	40,488	47,678	4,052	4,248	125,735	349,712	356,416	130,441	189,969	40,054
Illinois.....	11	61	1,069	43,350	43,350	131	233	6,185	63,520	73,319	4,322	4,808	101,500	316,365	329,005	108,754	220,034	70,540
Indiana.....	2	4	100	2,600	2,600	33	46	1,111	7,940	11,160	740	828	23,306	31,652	32,620	30,767	35,456	8,120
Iowa.....	15	100	1,773	131,461	131,461	330	600	12,712	252,617	306,507	2,234	2,306	71,429	211,652	215,068	85,914	130,917	66,687
Kentucky.....	6	41	629	85,759	85,759	143	354	3,328	193,077	303,003	664	822	25,046	315,436	362,412	31,003	32,898	1,521
Louisiana.....	3	21	282	14,000	17,784	131	292	6,648	51,187	64,906	4,042	5,540	19,815	315,436	362,412	45,025	165,944	14,145
Maine.....	13	98	1,427	113,714	122,403	323	503	10,787	232,341	290,093	3,679	4,431	170,455	1,001,346	1,001,346	190,252	205,791	97,530
Maryland.....	6	85	1,043	107,901	121,929	403	521	13,436	34,733	34,733	1,752	1,752	16,130	100,770	100,770	61,502	95,245	20,815
Massachusetts.....	3	22	308	14,000	14,000	37	71	2,377	23,177	34,733	1,752	1,752	16,130	100,770	100,770	61,502	95,245	20,815
Michigan.....	11	45	862	42,400	47,652	171	297	6,628	73,717	144,733	782	828	23,306	31,652	32,620	30,767	35,456	8,120
Minnesota.....	9	65	1,009	79,524	88,277	304	369	8,289	143,717	133,403	1,570	1,620	18,746	254,150	257,821	96,296	136,405	33,205
Missouri.....	1	18	273	11,000	11,000	107	183	3,351	43,293	52,501	3,013	3,013	75,643	166,944	167,938	81,237	95,245	20,815
New Hampshire.....	4	49	470	79,700	79,700	325	453	9,814	92,754	90,242	1,473	1,574	77,030	216,072	220,340	84,234	89,775	14,248
New Jersey.....	18	174	2,673	40,700	40,700	847	3,136	40,328	100,249	110,249	13,995	675,521	147,657	1,476,564	1,486,423	727,420	887,874	91,293
New York.....	5	29	513	135,792	145,292	306	474	7,832	80,184	92,615	9,637	9,730	104,065	158,564	158,564	51,576	100,591	73,560
North Carolina.....	36	180	3,620	256,405	256,405	911	1,175	15,052	149,262	201,077	11,601	12,896	414,703	1,342,249	1,342,249	440,977	408,111	60,924
Ohio.....	22	134	3,620	256,405	256,405	911	1,175	15,052	149,262	201,077	11,601	12,896	414,703	1,342,249	1,342,249	440,977	408,111	60,924
Pennsylvania.....	1	12	283	23,000	23,000	302	46	1,601	32,483	32,483	416	51	33,130	100,461	100,461	95,014	98,359	3,340
Rhode Island.....	8	83	1,065	65,307	67,689	264	323	7,467	90,549	90,549	234	739	17,838	200,600	200,600	96,025	40,203	15,684
South Carolina.....	18	83	1,065	65,307	67,689	264	323	7,467	90,549	90,549	234	739	17,838	200,600	200,600	96,025	40,203	15,684
Tennessee.....	2	7	165	1,000	1,000	97	124	9,082	21,358	21,358	117	124	9,082	21,358	21,358	117	124	9,082
Texas.....	5	30	464	21,358	21,358	117	257	6,864	48,495	56,197	2,930	3,197	93,457	179,181	179,181	100,728	109,711	6,189
Vermont.....	12	73	1,343	139,790	139,790	317	547	9,082	21,358	21,358	117	124	9,082	21,358	21,358	117	124	9,082
Virginia.....	2	8	75	4,700	4,700	58	86	2,792	13,706	19,209	1,423	1,529	58,917	113,133	113,874	61,615	56,354	6,361
Wisconsin.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Wyoming.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Alaska.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Arizona.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Colorado.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Idaho.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Kansas.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Montana.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Nebraska.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Nevada.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of New Mexico.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of North Dakota.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Oregon.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of South Dakota.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Utah.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Washington.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of West Virginia.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Territory of Wyoming.....	1	1	46	1,000	1,000	12	12	140	140	140	12	12	140	140	140	12	12	140
Total.....	289	1,678	27,821	1,964,428	2,142,359	6,085	12,260	263,096	4,144,214	5,831,179	84,978	91,906	3,354,011	9,529,542	9,850,793	3,644,928	4,063,046	962,898

STATISTICS OF COLLEGES AND COLLEGIATE DEPARTMENTS IN THE UNITED
CENT INFORMATION IN THE POSSESSION OF

NOTE 1.—Institutions not fully reported are to be understood as not being in recent correspondence
NOTE 2.—For statistics of the professional schools or departments connected with any of these institu-
cultural, &c., in this report.

NOTE 3.—In the columns of "Cost of tuition per term," and "Board per month," statistics marked
NOTE 4.—In this table the abbreviations in the column of "Denominations" are as follows: R. C.,
copal; Cong., Congregational; Pres., Presbyterian; Chr., Christian; U. P., United Presbyterian; C. P.,
tists; Univ., Universalist; Unit., Unitarian; Mor., Moravian; N. Ch., New Church; G. R., German
pal; E. A., Evangelical Associations; M. P., Methodist Protestant; C. and P., Congregational and Pres-

pal; E. A., Evangelical Associations; M. P., Methodist Protestant; C. and P., Congregational and Pres-
NOTE 5.—The existence of those colleges marked with an interrogation point (?) is considered doubt

Number.	Name.	Location.	Date of organization.	President.
1	East Alabama Male College.....	Auburn, Ala.....		J. T. Dunklin.....
2	Florence University.....(?)	Florence, Ala.....		
3	Wesleyan College.....(?)	do.....		
4	Southern University.....	Greensborough, Ala.....		A. S. Andrews, D. D.....
5	La Grange College.....(?)	La Grange, Ala.....	1830	
6	Howard College.....	Marion, Ala.....	1841	J. F. Murfee.....
7	Spring Hill College.....	(Spring Hill,) near Mobile, Ala.....	1835	Rev. J. Montillot, S. J.....
8	Talladega College.....	Talladega, Ala.....		
9	University of Alabama.....	Tuscaloosa, Ala.....	1832	N. T. Lupton, A. M.....
10	Cane Hill College.....	Cane Hill, Ark.....	1852	Rev. F. R. Earle, A. M.....
11	St. John's College.....	Little Rock, Ark.....	1857	Col. O. C. Gray, A. M.....
12	College of St. Augustine.....	Benicia, Cal.....	1868	Rev. W. P. Tucker, A. M.....
13	St. Vincent's College.....	Los Angeles, Cal.....	1867	Rev. J. McGill, C. M.....
14	Marysville College.....	Marysville, Cal.....		
15	Odd Fellows' College.....(?)	Napa City, Cal.....		
16	University of California.....	Oakland, Cal.....	1855	H. Durant, A. M.....
17	Petaluma College.....	Petaluma, Cal.....	1866	
18	St. Ignatius College.....	San Francisco, Cal.....	1855	Rev. J. Bayma, S. J.....
19	St. Mary's College.....	do.....	1863	Brother Justin.....
20	Union College.....	do.....		
21	University College.....	do.....	1859	Rev. Wm. Alexander.....
22	San Rafael College.....	San Rafael, Cal.....	1869	Alfred Bates.....
23	Franciscan College.....	Santa Barbara, Cal.....	1868	Rev. J. J. O'Keefe, O. S. F.....
24	College of our Lady of Guada- lupe.....	do.....		
25	Santa Clara College.....	Santa Clara, Cal.....	1851	Rev. A. Varsi, S. J.....
26	University of the Pacific.....	do.....		Rev. T. H. Sinex, D. D.....
27	Pacific Methodist College.....	Santa Rosa, Cal.....	1861	A. L. Fitzgerald.....
28	Sonoma College.....	Sonoma, Cal.....	1858	Rev. W. N. Cunningham.....
29	Pacific Methodist College.....	Vacaville, Cal.....	1851	Rev. J. R. Thomas, D. D., LL. D.....
30	California College.....	do.....	1871	M. Bailey, A. M.....
31	Hesperian College.....	Woodland, Cal.....	1869	J. M. Martin, A. M.....
32	Colorado College.....(?)	Golden City, Col. Ter.....		
33	Trinity College.....	Hartford, Conn.....	1823	Rev. Abner Jackson, D. D., LL. D.....
34	Wesleyan University.....	Middletown, Conn.....	1831	Rev. Joseph Cummings, D. D., LL. D.....
35	Yale College.....	New Haven, Conn.....	1701	Rev. Noah Porter, D. D., LL. D.....
36	Brandywine College.....(?)	Brandywine, Del.....		
37	Delaware College.....	Newark, Del.....	1869	W. H. Purnell, A. M.....
38	University of Georgia.....	Athens, Ga.....	1801	A. A. Lipscomb, D. D.....
39	Atlanta University.....	Atlanta, Ga.....	1867	E. A. Ware, A. M.....
40	Bowdon College.....	Bowdon, Ga.....	1856	Rev. F. H. M. Henderson, A. B.....
41	Oglethorpe College.....	Atlanta, Ga.....	1835	Rev. D. Wills, D. D.....
42	Mercer University.....	Macon, Ga.....	1838	Rev. A. J. Battle.....
43	Christ's College.....	Montpelier, Ga.....		
44	Montpelier College.....	do.....		
45	Emory College.....	Oxford, Ga.....	1837	Rev. L. M. Smith, D. D.....
46	Abingdon College.....	Abingdon, Ill.....	1853	J. W. Butler, A. M.....
47	Illinois Wesleyan University.....	Bloomington, Ill.....	1852	Rev. O. S. Munsell, D. D.....
48	St. Viator's College.....	Bourbonnais Grove, Ill.....	1866	Very Rev. P. Beaudoin.....
49	Blackburn University.....	Charlinville, Ill.....		Rev. J. W. Bailey, D. D.....
50	Chicago University.....	Chicago, Ill.....	1859	Rev. J. C. Burroughs, D. D., LL. D.....
51	St. Ignatius College.....	do.....	1870	Rev. A. Damen.....
52	St. Aloysius College.....	East St. Louis, Ill.....	1868	Rev. F. H. Zabel, D. D., D. C. L.....
53	Eureka College.....	Eureka, Ill.....	1852	H. W. Everest, A. M.....

STATES AUTHORIZED TO CONFER DEGREES IN ARTS, COMPILED FROM THE MOST RE-
THE UNITED STATES BUREAU OF EDUCATION.

with the office.

tions, reference is made to the appropriate tables, theological, legal, medical, normal, commercial, agri-

"a" mean the given amount per annum; "b" signifies board and tuition per annum.

Roman Catholic; Bapt., Baptist; Mas., Masonic; M. E., Methodist Episcopal; P. E., Protestant Epis-
Cumberland Presbyterian; Luth., Lutheran; Fr., Friends; U. B., United Brethren; F. B., Free Bap-
Reformed; Ref., Reformed, (Dutch;) L. D. S., Latter-Day Saints; A. M. E., African Methodist Episco-
byterian; M. E. S., Methodist Episcopal, South.

Number.	Denomination.	Students.								Cost of—		Number of volumes in library.	Time of commencement.		
		Number of instructors.	Preparatory department.	Freshmen.	Sophomores.	Juniors.	Seniors.	Other schools not profes- sional.	Males.	Females.	Total.			Tuition per term.	Board per month.
1	M. E. S.	7	15			22	55		92		98	a\$70	\$18		Last Wednesday in June.
2	Pres														
3	M. E.	5													
4	Pres														
5	Bapt.	5							142		142	50		2,500	Last Thursday in June.
6	R. C.	17	40	6	6				52		52	b328		8,000	4th Tuesday in August.
7															
8		11							64		64	a50	a150	3,000	Last Wednesday in June.
9		3	77					27	104		104	a50	13		
10	Mas	6							67		67	a50	18		
11	P. E.	7	49	10	14	8	9		90		90	20-50	25	1,100	Thursday after 1st Wednes- day of June.
12															August 16.
13	R. C.	4							50		50	a250	25	1,000	
14															
15	State	18	174	32	13	2	5	26	247	5	252	Free	a200-320		3d Wednesday in July.
16	Bapt.														
17	R. C.	19							559		559	36			June 5.
18	R. C.														
19															
20															
21															
22															
23	R. C.	6	30			30	30	2	92		92	a150		2,000	March 2.
24															
25	R. C.	17							225		225	b350		12,000	1st Tuesday in June.
26	M. E.	6	86	2	2	2	3	20	55	60	115	a30-60	20-25	2,000	May 30.
27	M. E.	6	115	20	10	3	2		78	72	150	a30-70	20	500	Middle of May.
28															
29	M. E.	7	62	23	6	6	6	96	119	82	207	a30-80	20		May 18.
30	Bapt.	4	32	8					25	17	42	25-40	20	300	3d Wednesday in May
31	Chr.	7	87	11		14	4	37	82	71	153	154-341	22	150	2d Friday in May.
32															
33	P. E.	16		49	42	42	30		163		163	a90	18	15,000	2d Thursday in July.
34	M. E.	19		49	42	42	30		163		163	a33	18	20,000	3d Thursday in July.
35	Cong	25		130	134	135	128		527		527	30	22	90,000	Last Thurs. but two in July.
36															
37	State	6	44	22					72		72	a60	16		1st Wednesday in July.
38	State	12		14	59		33	125	231		231	b300		20,000	1st Wednesday in August.
39									111	59	170				
40		5	51	23	12	6	6		102		102	a54	a150		1st Wednesday in July.
41	Pres	6	75					75	150		150	18-25	5,000		1st Wednesday in July.
42	Bapt.	5		14	24	24	20		82		82	a100	18	5,000	2d Wednesday in July.
43															
44															
45	M. E. S.	7	34	28	47	41	23		13	186	186	35	18	7,000	Wednesday after 3d Mon- day in July.
46	Chr.														
47	M. E.	6	132	6	4	1	1	56	200		200	a33	19	1,500	June 20.
48	R. C.	9										b207			
49	Pres	8	24	6	5	2	2	231	181	93	274	b150			2d Thursday in June.
50	Bapt.	14	186	26	16	15	10	24	275		275	a50	10	4,000	Last Thursday in June.
51	R. C.	6	64	43					107		107	a60			About the end of June.
52	R. C.	4							50		50	a40	16	300	1st Monday in September.
53	Chr.	6							100	35	135				1st Wednesday in June.

STATISTICS OF COLLEGES AND COLLEGIATE

Number.	Name.	Location.	Date of organization.	President.
54	Northwestern University.....	Evanston, Ill.....	1855	E. O. Haven, D. D., LL. D.
55	Lombard University.....	Galesburgh, Ill.....	1852	Rev. J. P. Weston, D. D.
56	Knox College.....	do.....	1841	Rev. J. P. Gulliver, D. D.
57	Marshall College..... (?)	Henry, Ill.....	1855	
58	Illinois College.....	Jacksonville, Ill.....	1830	Rev. J. M. Startevant, D. D.
59	McKendree College.....	Lebanon, Ill.....	1835	Rev. R. Allyn, D. D.
60	Lincoln University.....	Lincoln, Ill.....	1865	J. C. Bowdon, D. D.
61	Mendota College..... (?)	Mendota, Ill.....	1855	Rev. J. W. Corbet, A. M.
62	Monmouth College.....	Monmouth, Ill.....	1856	D. A. Wallace, D. D., LL. D.
63	Northwestern College.....	Naperville, Ill.....	1865	Rev. A. A. Smith, A. M.
64	Augustana College.....	Paxton, Ill.....	1860	Rev. T. N. Hasselquist
65	Quincy College.....	Quincy, Ill.....	1854	G. W. Gray, A. M.
66	Jubilee College.....	Robin's Nest, Ill.....	1847	Rt. Rev. H. J. Whitehouse, D. D.
67	St. Patrick's College..... (?)	Ruma, Ill.....		
68	Shurtleff College.....	Upper Alton, Ill.....	1832	J. Bulkley, D. D.
69	Westfield College.....	Westfield, Ill.....	1861	Rev. S. B. Allen, A. M.
70	Wheaton College.....	Wheaton, Ill.....		Rev. J. Blanchard, A. M.
71	Illinois Industrial University.....	Urbana, Ill.....	1868	J. M. Gregory, LL. D.
72	Dunkard College..... (?)	Bourbon, Ind.....		
73	Indiana University.....	Bloomington, Ind.....	1828	Rev. C. Nutt, D. D.
74	Brookville College.....	Brookville, Ind.....	1851	Rev. J. P. D. John, A. M.
75	Wabash College.....	Crawfordsville, Ind.....	1834	Rev. J. F. Tuttle, D. D.
76	Franklin College.....	Franklin, Ind.....	1843	H. L. Wayland, D. D.
77	Fort Wayne College.....	Fort Wayne, Ind.....	1846	Rev. L. Beers, A. B.
78	Concordia College.....	do.....	1850	Rev. W. Sihler, Ph. D.
79	Indiana Asbury University.....	Greencastle, Ind.....	1837	Rev. T. Bowman, D. D.
80	Hanover College.....	Hanover, Ind.....	1833	Rev. G. C. Heckman, D. D.
81	Hartsville University.....	Hartsville, Ind.....	1850	J. W. Scribner, A. M.
82	Northwestern Christian University.....	Indianapolis, Ind.....	1855	W. F. Black, A. M.
83	Union Christian College.....	Merom, Ind.....	1859	Rev. T. Holmes, D. D.
84	Moore's Hill College.....	Moore's Hill, Ind.....	1853	Rev. J. H. Martin, A. M.
85	Salem College.....	Bourbon, Ind.....	1870	O. W. Miller, A. M.
86	University of Notre Dame.....	Notre Dame, Ind.....	1862	Very Rev. W. Corby
87	Earlham College.....	Richmond, Ind.....	1860	J. Moore, A. M.
88	St. Meinrad's College.....	St. Meinrad, Ind.....	1860	Rev. J. Hobie, O. S. B.
89	Valparaiso College.....	Valparaiso, Ind.....		Rev. T. B. Wood.
90	Smithson College.....	do, Ind.....		Rev. P. R. Kendall.
91	Howard College.....	Kokomo, Ind.....		
92	Burlington University.....	Burlington, Iowa.....	1854	J. Henderson
93	Griswold College.....	Davenport, Iowa.....	1859	Rev. E. Lounsbury, A. M.
94	Norwegian Luther College.....	Decorah, Iowa.....	1861	Prof. L. Larsen
95	Parson's College..... (?)	Des Moines, Iowa.....		
96	Fairfield College.....	Fairfield, Iowa.....		Rev. A. Axline, A. M.
97	Upper Iowa University.....	Fayette, Iowa.....	1858	B. W. McLain, A. M.
98	Iowa College.....	Grinnell, Iowa.....		Rev. G. F. Magoun, D. D.
99	Simpson Centenary College.....	Indianola, Iowa.....	1867	Rev. A. Burns, D. D.
100	Iowa State University.....	Iowa City, Iowa.....	1860	Rev. G. Thacher, D. D.
101	Iowa Wesleyan University.....	Mount Pleasant, Iowa.....	1851	John Wheeler, D. D.
102	Cornell College.....	Mount Vernon, Iowa.....	1857	Rev. W. F. King, D. D.
103	Central University of Iowa.....	Pella, Iowa.....	1854	Rev. L. A. Dunn.
104	Whittier College..... (?)	Salem, Iowa.....	1867	J. H. Pickering
105	Humboldt College.....	Springvale, Iowa.....		Rev. S. H. Taft.
106	Tabor College.....	Tabor, Iowa.....		Rev. W. M. Brooks, A. M.
107	St. Benedict's College.....	Atchison, Kans.....	1859	Very Rev. G. Christoph.
108	Baker University.....	Baldwin City, Kans.....	1858	Rev. J. A. Simpson, A. M.
109	Highland University.....	Highland, Kans.....	1859	Rev. J. A. McAfee.
110	State University.....	Lawrence, Kans.....	1864	John Fraser, A. M.
111	Ottawa University.....	Ottawa, Kans.....		
112	Washburn College.....	Topeka, Kans.....	1865	Rev. P. McVicar, D. D.
113	Lane University.....	Lecompton, Kans.....	1865	N. B. Bartlett
114	Berea College.....	Berea, Ky.....	1858	Rev. E. H. Fairchild.
115	Cecilian College.....	Cecilian Post Office, Ky.....	1860	H. A. Cecil
116	Centre College.....	Danville, Ky.....	1823	O. Beatty, LL. D.
117	Kentucky Military Institute.....	Near Frankfort, Ky.....	1846	Col. R. T. P. Allen, A. M., C. E.

DEPARTMENTS IN THE UNITED STATES, &c.—Continued.

Number.	Denomination.	Students.									Cost of --		Number of volumes in library.	Time of commencement.	
		Number of instructors.	Preparatory department.	Freshmen.	Sophomores.	Juniors.	Seniors.	Other schools not professional.	Males.	Females.	Total.	Tuition per term.			Board per month.
54	M. E.	39	185	40	22	20	15	20	289	18	307	\$7	\$20	27,000	4th Tuesday in June.
55	Univ.	9	107	18	10	4	11	156	156	33	189	33	18	3,500	3d Wednesday in June.
56	Cong.	15	127	26	9	13	13	78	156	110	266	a30	18	6,200	4th Thursday in June.
57	Cong.	12	...	...	...	...	...	...	324	324	...	...	...	...	...
58	M. E.	7	39	14	14	10	6	178	218	43	261	8	18	8,500	3d Thursday in June.
59	C. P.	6	98	13	8	18	11	53	140	66	206	a26-40	16-18	...	2d Thursday in June.
60	Luth.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
61	U. P.	13	147	19	13	27	18	117	218	123	341	a30	17	1,500	Last Thursday in June.
62	E. A.	10	21	10	6	8	4	195	164	80	244	6-8	12-16	600	Last Wednesday in June.
63	Luth.	3	31	7	2	...	...	...	58	58	...	...	...	7,000	...
64	M. E.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
65	P. E.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
66	Bapt.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
67	U. B.	7	3	4	1	1	...	160	128	41	169	a24	14	...	2d Wednesday in June.
68	Cong.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
69	State	...	...	...	...	...	...	...	...	...	...	...	...	...	...
70	State	13	50	46	26	27	23	136	277	31	308	Free	16	5,000	Thursday preceding 4th of July.
71	M. E.	6	...	...	...	...	...	80	70	150	...	9	16	2,000	June 7.
72	Pres.	10	138	33	27	10	18	226	226	...	...	10	14	12,000	3d Thursday in June.
73	Bapt.	7	29	84	4	6	4	34	103	56	161	4-15	15	...	June 21.
74	Meth.	...	...	...	...	...	...	...	...	...	...	a24	a60	3,000	September 1.
75	Luth.	...	...	...	...	...	...	...	...	...	...	10	14-20	10,000	June 21.
76	M. E.	9	77	68	39	32	33	84	298	35	333	10	14-20	6,400	4th Thursday in June.
77	Pres.	7	47	25	9	16	7	53	157	157	...	Free	a144	...	2d Tuesday in June.
78	U. B.	7	17	2	1	...	2	201	140	74	233	18	a72-117	...	June 24.
79	Chr.	22	113	13	5	3	9	156	219	80	299	14	18	...	...
80	Chr.	5	16	2	2	2	...	129	100	51	151	6-10	16	390	2d Wednesday in June.
81	Meth.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
82	Bapt.	...	...	...	...	...	...	...	...	...	...	7-15	14	...	June 15.
83	R. C.	...	...	...	...	...	...	...	...	...	...	b150	...	11,000	Last Wednesday in June.
84	Fr.	...	...	...	...	...	...	...	...	...	...	b300	...	3,300	June 26.
85	R. C.	7	19	7	8	15	7	...	56	56	...	15	15	4,000	Last Thursday in June.
86	Univ.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
87	Bapt.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
88	P. E.	7	103	4	3	5	2	117	117	117	...	16	14	4,000	3d Wednesday in June.
89	Luth.	6	86	24	12	5	5	136	136	136	...	Free	7	1,000	About June 15.
90	Luth.	2	...	...	...	...	...	...	53	65	118	...	...	...	...
91	M. E.	10	141	17	7	5	...	...	86	84	170	9	13	4,000	4th Tuesday in June.
92	Cong.	12	4	13	13	6	9	193	174	108	222	20	8-16	7,000	2d Wednesday in July.
93	M. E.	13	122	4	3	2	24	26	86	73	159	9	10-16	200	2d Wednesday in June.
94	State.	30	136	52	42	28	9	7	220	116	345	5	12-20	5,000	Last Wednesday in June.
95	M. E.	16	118	15	14	6	11	104	159	109	263	Free	12-16	1,500	3d Wednesday in June.
96	M. E.	9	102	31	6	6	5	214	253	111	361	7	12-16	4,000	3d Tuesday in June.
97	Bapt.	7	...	...	...	...	...	...	...	...	...	...	...	...	...
98	Fr.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
99	Unit.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
100	Cong.	6	8	9	4	2	...	176	114	85	199	7	16	2,500	2d Wednesday in June.
101	R. C.	8	...	...	...	...	...	...	51	51	...	b200	...	1,200	...
102	M. E.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103	Pres.	6	77	10	6	4	3	...	53	45	100	7-12	3-4	4,000	June 20.
104	State	9	...	...	...	...	...	...	97	116	213	...	...	...	...
105	Bapt.	...	...	...	...	...	...	...	...	...	...	...	...	...	...
106	Cong.	8	25	6	...	2	...	35	53	15	68	a30	16-20	2,000	3d Wednesday in June.
107	U. B.	3	...	...	...	...	...	...	...	...	...	a30	...	...	...
108	...	12	22	9	5	...	...	259	188	107	295	3	7-10	600	2d Wednesday in July.
109	R. C.	9	...	...	...	...	...	...	162	162	...	b200	...	...	2d Friday in June.
110	Pres.	7	95	17	20	8	7	18	165	165	...	a40	16-20	5,500	Last Thursday in June.
111	State.	7	15	43	34	11	9	...	112	112	...	a100	a250	...	1st Monday in September.

STATISTICS OF COLLEGES AND COLLEGIATE

Number.	Name.	Location.	Date of organization.	President
119	Georgetown College	Georgetown, Ky	1838	Basil Manly, jr., D. D.
120	Kentucky University	Lexington, Ky	1859	J. B. Bowman, A. M., regent
121	St. Mary's College	Marion County, Ky	1820	Rev. L. Elend, C. R., LL. D.
122	Bethel College	Russellville, Ky	1856	N. K. Davis, LL. D.
123	Thompson University	Baldwin, La	1867	W. S. Wilson
124	Louisiana State University	Baton Rouge, La	1860	D. F. Boyd
125	Baton Rouge College	do	1836	
126	St. Charles College	Grand Coteau, La	1872	Rev. J. Roduit, S. J.
127	Centenary College	Jackson, La	1845	W. H. Watkins, D. D.
128	Mount Lebanon University	Mount Lebanon, La	1853	S. C. McCormick
129	College of the Immaculate Conception	New Orleans, La	1848	Rev. J. Gautrelet
130	Leland University	do		E. E. S. Taylor, D. D.
131	Straight University	do	1869	
132	Jefferson College	St. Michael, La		
133	Bowdoin College	Brunswick, Me	1862	J. L. Chamberlain, LL. D.
134	Bates College	Lewiston, Me	1863	Rev. O. B. Cheney, D. D.
135	Colby University	Waterville, Me	1820	J. T. Champin, D. D.
136	St. John's College	Annapolis, Md	1784	J. M. Garnett, M. A.
137	Loyola College	Baltimore, Md	1852	Rev. S. A. Kelly, S. J.
138	Washington College	Chestertown, Md	1782	R. C. Berkeley, A. M.
139	Rock Hill College	Ellicott City, Md	1857	Brother Bettelin
140	St. Charles College	do	1848	Rev. S. Férté, D. D.
141	Mount St. Mary's College	Emmitsburgh, Md	1830	Very Rev. J. McCaffrey, D. D.
142	Mount St. Clement's College	Hchester, Md	1868	Rev. F. Van de Braak, C. S., S. R.
143	Calvert College	New Windsor, Md	1852	A. H. Baker, A. M.
144	Borromeo College	Pikesville, Md	1860	Rev. E. Q. S. Waldron
145	Frederick College	Frederick City, Md	1796	J. S. Bonsall, A. M.
146	Western Maryland College	Westminster, Md	1867	J. T. Ward, D. D.
147	Amherst College	Amherst, Mass	1821	W. A. Stearns, D. D., LL. D.
148	Boston College	Boston, Mass	1863	Rev. R. Fulton, S. J.
149	Harvard College	Cambridge, Mass	1638	C. W. Eliot, LL. D.
150	Tufts College	College Hill, Mass	1855	A. A. Miner, D. D.
151	Williams College	Williamstown, Mass	1793	Rev. M. Hopkins, D. D., LL. D.
152	College of the Holy Cross	Worcester, Mass	1843	Rev. A. F. Ciampi
153	Adrian College	Adrian, Mich	1858	A. H. Lowrie, A. M.
154	Albion College	Albion, Mich	1860	G. B. Jocelyn, D. D.
155	Michigan University	Ann Arbor, Mich	1841	J. B. Angell, LL. D.
156	St. Philip's College	Detroit, Mich		
157	Hillsdale College	Hillsdale, Mich		D. M. Graham, D. D.
158	Hope College	Holland, Mich		Philip Phelps, D. D.
159	Kalamazoo College	Kalamazoo, Mich	1855	Rev. K. Brooks, D. D.
160	Olivet College	Olivet, Mich	1855	Rev. N. J. Morrison, D. D.
161	St. John's College	Clinton, Minn		
162	Carleton College	Northfield, Minn	1866	Rev. J. W. Strong, D. D.
163	University of Minnesota	St. Anthony, Minn	1868	W. W. Folwell, M. A.
164	Simple-Broadus College	Centre Hill, Miss	1857	W. W. Hawkins, A. M.
165	Mississippi College	Clinton, Miss	1851	Rev. W. Hillman, A. M.
166	Shaw University	Holly Springs, Miss	1871	Rev. A. C. McDonald, A. M.
167	Alcorn University	Jackson, Miss	1871	Rev. H. R. Revels
168	Oakland College	Oakland, Miss	1830	W. L. Breckenridge, D. D.
169	University of Mississippi	Oxford, Miss	1848	J. N. Waddell, D. D.
170	Pass Christian College	Pass Christian, Miss	1866	Brother Isaiah
171	Madison College	Sharon, Miss	1850	Rev. J. M. Pugh, A. M.
172	Tongaloo University	Near Tongaloo, Miss	1870	E. Tucker, A. M.
173	Jefferson College	Washington, Miss	1813	Prof. Hamilton
174	St. Vincent's College	Cape Girardeau, Mo	1843	Rev. J. Alizeri
175	University of Missouri	Columbia, Mo	1843	Daniel Read, LL. D.
176	Central College	Fayette, Mo	1854	Rev. J. C. Wills, A. M.
177	Westminster College	Fulton, Mo	1853	Rev. N. L. Rice, D. D.
178	Lewis College	Glasgow, Mo	1867	Rev. T. A. Parker, A. M., M. D.
179	Jefferson City College	Jefferson City, Mo	1867	Rev. W. H. D. Hutton
180	William Jewell College	Liberty, Mo	1848	Rev. T. Rambaut, LL. D., S. T. P.
181	Palmyra College	Palmyra, Mo	1848	Rev. J. A. Wainwright, A. M.
182	St. Charles College	St. Charles, Mo	1850	J. J. Potts, A. M.
183	Grand River College	Edinburgh, Mo	1858	J. E. Vettes
184	Woodland College	Independence, Mo	1869	W. A. Buckner
185	Lincoln College	Greenwood, Mo	1869	G. S. Bryant

Number.	Denomination.	Students.									Cost of—		Number of volumes in library.	Time of commencement.
		Number of instructors.	Preparatory department.	Freshmen.	Sophomores.	Juniors.	Seniors.	Other schools not professional.	Males.	Females.	Total.	Tuition per term.		
119	Bapt.	7	47	43	36	11	8		145	145	a\$45	\$18-20	5,500	2d Thursday in June.
120	State.	23							216	216	a\$31	20	10,000	2d Thursday in June.
121	R. C.								57	58	b\$300			1st Thursday in September.
122	Bapt.								60	60				
123	M. E.	2	55						30	35	55		1,000	
124	State.	18	27	10	8	5	5	132	184	184	a100	a200	7,000	Last Wednesday in June.
125														
126	R. C.	11							85	85	b200			2d Wednesday in August
127	Meth.													
128	Bapt.													
129	R. C.													
130	Bapt.	10								1054				
131														
132														
133	Cong.	26		60	38	37	26		161	161	a60	10-16	34,150	2d Wednesday in July.
134	E. B.	9		24	23	27	14		87	87	a36	a76-114	7,100	Last Wednesday in June.
135	Bapt.	7		20	13	11	8		51	51	10	12	12,000	Last Thursday in July.
136	State.	10	76	24	22	10	6		132	138	b250		3,000	Last Wednesday in July.
137	R. C.	13	132	8	7	2	2		12	152	a75		21,500	Last Wednesday in June.
138	State.	22	16	9	5	1	1		33	33	40-60	16	1,000	2d Wednesday in July.
139	R. C.	22							166	166	b250			Last Thursday in June.
140	R. C.	22							166	166	b150		4,000	July.
141	R. C.	11	92	18	7	7	5		129	129	b310		5,000	Last Wednesday in June.
142	R. C.												1,200	
143	R. C.	8							59	59	b240			Last Tuesday in June.
144	R. C.													
145	State.	3							103	103	a30		1,200	
146	M. P.	10	74	30	13	6	4		84	43	a20-110	18	2,000	3d Thursday in June.
147	Cong.	20		71	76	49	65		261	261	25	14-24	35,000	2d Thursday in July.
148	R. C.	10	118	9	2	9			240	140				4th Wednesday in June.
149		76	189	139	132	15		35	643	643	a150	a152-304	187,000	Last Wednesday in June.
150	Univ.	14		14	15	17	8	20	74	74	a60	a135	12,000	3d Wednesday in July.
151	Cong.	11		32	26	40	43		141	141	25	14-24	12,000	Last Thursday in June.
152	R. C.	10	96	20	11	11	2		140	140	b250			Last Thursday in June.
153	M. P.	9	86	1	5	3	5	60	99	61	a20		12	3d Thursday in June.
154	M. E.	6	137	11	7	9	13		108	69	Free	12	1,000	Last Thursday in June.
155	State.	33		160	93	77	84		69	458	Free	8-20	25,000	Last Wednesday in June.
156														
157	F. W. B.	14	313	19	15	9	9	220	365	220	a100	8-12	3,000	2d Thursday in June.
158														
159	Bapt.	12	175	8	4	4	11	7	138</					

STATISTICS OF COLLEGES AND COLLEGIATE

Number.	Name.	Location.	Date of organization.	President.
186	St. Paul's College.....	Palmyra, Mo.....	1869	Rev. R. Rose, A. M.....
187	Bethel College.....	Palmyra, Mo.....	1848	Rev. W. B. Corbin.....
188	Hannibal College.....	Hannibal, Mo.....	1865	J. F. Hamilton.....
189	McGee College.....	College Mound, Mo.....	1834	J. B. Mitchell.....
190	Johnson College.....	Macon City, Mo.....	1868	E. W. Hall.....
191	St. Joseph's College.....	St. Joseph, Mo.....	1867	Brother Agatho.....
192	St. Stephen's University.....	St. Louis, Mo.....	1832	Rev. J. G. Zealand, S. J.....
193	Washington University.....	do.....	1857	W. G. Eliot, D. D.....
194	College of the Christ'n Brothers.....	St. Louis, Mo.....	1857	Brother Edward.....
195	Congregational College.....	Fontenelle, Nebr.....		
196	Nebraska College.....	Nebraska City, Nebr.....	1868	Rev. J. McNamara, D. D.....
197	Dartmouth College.....	Hanover, N. H.....	1769	Rev. A. D. Smith, D. D., LL. D.....
198	Burlington College.....	Burlington, N. J.....	1846	Rt. Rev. W. H. Odenheimer, D. D.....
199	Rutgers College.....	New Brunswick, N. J.....	1770	Rev. W. H. Campbell, D. D., LL. D.....
200	College of New Jersey.....	Princeton, N. J.....	1746	Rev. J. McCosh, D. D., LL. D.....
201	Seton Hall College.....	South Orange, N. J.....	1856	Very Rev. M. A. Corrigan, D. D.....
202	Alfred University.....	Alfred, N. Y.....	1836	Rev. J. Allen.....
203	Franciscan College.....	Allegheny, N. Y.....		
204	St. Stephen's College.....	Annandale, N. Y.....	1860	Rev. R. B. Fairbairn, D. D.....
205	Brooklyn Collegiate and Poly- technic Institute.....	Brooklyn, N. Y.....	1854	D. H. Cochran, Ph. D., LL. D.....
206	St. John Baptist's College.....	do.....	1870	Rev. J. T. Landry, C. M.....
207	Canisius College.....	Buffalo, N. Y.....	1870	Rev. W. Becker, S. J.....
208	St. Joseph's College.....	do.....	1862	Brother Frank.....
209	Martin Luther College.....	do.....	1853	Rev. J. F. Winkler.....
210	St. Lawrence University.....	Canton, N. Y.....	1856	R. Fisk, jr., D. D.....
211	Hamilton College.....	Clinton, N. Y.....	1812	Rev. S. G. Brown, D. D., LL. D.....
212	St. John's College.....	Fordham, N. Y.....	1846	Rev. J. Shea, S. J.....
213	Robert College.....	Geneva, N. Y.....	1825	Rev. J. Rankine, D. D.....
214	Madison University.....	Hamilton, N. Y.....	1819	E. Dodge, D. D., LL. D.....
215	Cornell University.....	Ithaca, N. Y.....	1868	A. D. White, LL. D.....
216	Genesee College.....	Lima, N. Y.....	1849	
217	College of the City of New York.....	New York City, N. Y.....	1854	A. S. Webb, LL. D.....
218	College of St. Francis Xavier.....	do.....	1847	Rev. H. Hudon, S. J.....
219	Columbia College.....	do.....	1754	F. A. P. Barnard, S. T. D., LL. D.....
220	Manhattan College.....	do.....	1863	Brother Patrick.....
221	University of the City of New York.....	do.....	1831	Howard Crosby, D. D.....
222	St. Joseph's College.....	Rhinecliff, N. Y.....		Rev. M. J. Scully.....
223	University of Rochester.....	Rochester, N. Y.....	1850	M. B. Anderson, LL. D.....
224	Union College.....	Schenectady, N. Y.....	1795	Rev. E. N. Potter, D. D.....
225	Syracuse University.....	Syracuse, N. Y.....	1870	D. Steele, D. D., (acting).....
226	Rensselaer Polytechnic Insti- tute.....	Troy, N. Y.....		
227	University of North Carolina.....	Chapel Hill, N. C.....	1795	S. Pool.....
228	Wake Forest College.....	Forestville, N. C.....	1831	W. M. Wingate, D. D.....
229	Rutherford College.....	Happy Home P. O., N. C.....	1870	Rev. R. L. Abernethy, A. M.....
230	Ohio College.....	Iredell County, N. C.....	1853	J. Southgate.....
231	Davidson College.....	Mecklenburgh County, N. C.....	1837	Rev. G. W. McPhail, D. D., LL. D.....
232	North Carolina College.....	Mount Pleasant, N. C.....	1859	Rev. L. A. Bille, A. M.....
233	Trinity College.....	Randolph County, N. C.....	1850	Rev. B. Craven, D. D.....
234	Buchtel College.....	Akron, Ohio.....		Rev. H. F. Miller, Sec.....
235	Ohio University.....	Athens, Ohio.....	1804	Rev. S. Howard, D. D., LL. D.....
236	Baldwin University.....	Berea, Ohio.....	1856	W. D. Godman, D. D.....
237	German Wallace College.....	Cincinnati, Ohio.....	1863	W. Nast, D. D.....
238	St. Xavier College.....	do.....	1842	Rev. T. O'Neill.....
239	Mount St. Mary's of the West.....	do.....	1851	F. J. Pabish, D. D., LL. D., D. C. L.....
240	Farmers' College.....	College Hill, Ohio.....	1846	C. D. Curtis.....
241	Capitol University.....	Columbus, Ohio.....		Rev. W. F. Lehman.....
242	Kenyon College.....	Gambier, Ohio.....	1824	E. T. Tappan.....
243	Denison University.....	Granville, Ohio.....	1831	Rev. S. Talbot, D. D.....
244	Harlem Springs College.....	Harlem Springs, Ohio.....	1867	
245	Western Reserve College.....	Hudson, Ohio.....	1826	C. Cutler, A. M.....
246	St. Louis College.....	Louisville, Ohio.....	1866	F. Hours.....
247	Marietta College.....	Marietta, Ohio.....	1835	I. W. Andrews, D. D.....
248	Mount Union College.....	Mount Union, Ohio.....	1846	Rev. O. N. Hartshorn, LL. D.....

DEPARTMENTS IN THE UNITED STATES, &c.—Continued.

Number.	Denomination.	Students.										Cost of—		Number of volumes in library.	Time of commencement.	
		Number of instructors.	Preparatory department.	Freshmen.	Sophomores.	Juniors.	Seniors.	Other schools not professional.	Males.	Females.	Total.	Tuition per term.	Board per month.			
186											70					
187		2									80					
188		4									80					
189		11									213					
190		3									80					
191	R. C.															
192	R. C.	22	124	21	6	7	3		161		161	b280		16,000	Last Thursday in June.	
193	R. C.	27	104	10	6	5	4	185	314		314	a45		6,000	3d Thursday in June.	
194	R. C.															
195	Cong.															
196	P. E.	5	9						20	20	20	b220		1,500	Last Thursday in June.	
197	Cong.	23		60	75	78	69		78	360	360		\$10-16	44,900	Last Thursday in June.	
198	P. E.	5														
199	Ref.	13	195	54	47	50	32		385		385	a75	16-24		3d Wednesday in June.	
200	Pres.	18		77	106	87	95		530		380	a140	16-24	30,000	Last Wednesday in June.	
201	R. C.	15	58	14	7	8	12		30	130	130	b400		8,000	Last Wednesday in June.	
202	Bapt.	21	90	33	27	15	5		328	166	222	408	10	6-12	6,000	1st Wednesday in July.
203																
204	P. E.	8	27	14	10	15	8		74		74	Free	a225	1,800	1st Thursday in July.	
205		26	438						124	562	562	a120		3,000	3d Wednesday in June.	
206	R. C.															
207	R. C.	6							62		62	a50			About the end of June.	
208	R. C.	14							201		201	b220		2,000	July 2.	
209	Luth.															
210	Univ.	13		11	14	6	10		6	27	20	a25	12	6,000	Last Wednesday in June.	
211	Pres.	12		45	39	39	41		164		161	a114-190		12,000	Thursday after last Tuesday in June.	
212	R. C.	21							265		265	b300			Last Wednesday in June.	
213	P. E.	9		14	3	15	7		39		39	15	16-20	13,000	2d Thursday after 4th July.	
214	Bapt.	12	51	34	24	40	16		165		165	a30	12	10,454	3d Wednesday in June.	
215		38		10	22	4	5	419	420	400	400	a45	a220	30,000	4th Thursday in June.	
216	M. E.	4				10	7		25	48	8	56	Free	5,300	2d Thursday in July.	
217	City	36	410	153	72	49	39		723		723	Free		29,000	Last Thursday in June.	
218	R. C.	25	71	37	29	17	16		107	477	477	a60		14,000	Last Monday in June.	
219	P. E.	12		31	32	25	29		117		117	Free		2,600	Last Wednesday in June.	
220	R. C.	43	448	27	23	15	11		101	631	631	a50	30	6,500	June 30.	
221		35		27	31	21	28		107		107	Free		3,000	2d Thursday before July 4.	
222	R. C.															
223	Bapt.	9		23	22	19	24		33	121	121	20	14-20		Last Wednesday in June.	
224	Pres.	16		20	25	25	19		89		89	15	13-20	19,000	Wednesday before 4th July.	
225	M. E.	7		29	7	6	17		51	9	60	20	18-20	1,395	4th Thursday in June.	
226		12														
227	State	6							55		55	a40	12	21,700	2d Thursday in June.	
228	Bapt.	6							100		100	a70	10-12	8,000	4th Thursday in June.	
229	Meth.	7	14						109	95	28	a50	7-10	200	1st Wednesday in August.	
230																
231	Pres.	7		22	36	16	32		6	112	112	a45	14	3,000	Last Thursday in June.	
232	Luth.	5	70	6	6		3		74		81	a20-40	8-10	1,200	Last Thursday in June.	
233	M. E. S.	6	23	34	21	18	16		54	165	165	a65	10-13		3d Thursday in June.	
234	Univ.															
235	State	5	67	9	6	5	5		29	121	121	10		5,000	Last Friday in June.	
236	M. E.	11	20	5	3	3	6		169	116	90	a21		1,000	Second Thursday in June.	
237	M. E.	5							74	19	93	4-9		600	Second Thursday in June.	
238	R. C.	17	188	34	21	17	9		269		269	a60		12,000	Last Wednesday in June.	
239	R. C.	16							80		80		16	10,000	June 24.	
240	Meth.															
241	Luth.															
242	P. E.	12	47	13	13	9	10		92		92	a42	12-16	18,320	Last Thursday in June.	
243	Bapt.	8	49	22	14	13	7		97	202	202	a34	12	10,500	Last Thursday in June.	
244																
245		11	42	16	17	20	14		109		109	a30	10-16	10,000	Last Wednesday in June.	
246	R. C.															
247	C. & P.	9	92	35	26	13	17		183		183	a38	10-16	23,350	Wednesday before July 4.	
248	M. E.	19	30	172	93	40	54		275	418	246	13	a108	3,400	Last Thursday in July.	

STATISTICS OF COLLEGES AND COLLEGIATE

Number.	Name.	Location.	Date of organization.	President.
249	Franklin College	New Athens, Ohio	1822	A. F. Ross, LL. D.
250	Muskingum College	New Concord, Ohio	1837	Rev. D. Paul, A. M.
251	Oberlin College	Oberlin, Ohio	1834	Rev. J. H. Fairchild, D. D.
252	Miami University	Oxford, Ohio	1809	Rev. A. D. Hepburn
253	Richmond College	Richmond, Ohio	1835	L. W. Ong, A. M.
254	Wittenberg College	Springfield, Ohio	1844	Rev. S. Sprecher, D. D.
255	Heidelberg College	Tiffin, Ohio	1850	Rev. G. W. Willard, D. D.
256	Urbana University	Urbana, Ohio	1852	Rev. F. Sewall, A. M.
257	Otterbein University	Westerville, Ohio	1837	Rev. L. Davis, D. D.
258	Willoughby College	Willoughby, Ohio	1855	L. O. Lee
259	University of Wooster	Wooster, Ohio	1870	Rev. W. Lord, D. D.
260	Antioch College	Yellow Springs, Ohio	1854	Rev. W. Hosmer, D. D.
261	Weller College	Near Xenia, Ohio	1863	Rt. Rev. D. A. Payne, D. D.
262	Xenia College	Xenia, Ohio	1850	Wm. Smith, A. M.
263	Ohio Wesleyan University	Delaware, Ohio	1842	Rev. F. Merrick, D. D.
264	New Market College	Scio P. O., Ohio	1859	A. D. Lee, A. M.
265	Ohio Central College	Iberia, Ohio	1854	E. F. Reed
266	Hiram College	Hiram, Ohio	1867	B. A. Hinsdale, A. M.
267	Pacific University	Forest Grove, Oreg.	1859	Rev. S. H. Marsh, D. D.
268	Oregon College	Oregon City, Oreg.	1850	G. C. Chandler, D. D.
270	Willamette University	Salem, Oreg.	1853	T. M. Gatch, A. M.
271	Holy Angels College	Vancouver, Oreg.		Prof. Biddle
272	Philomath College	Philomath, Oreg.		
273	Avery College	Allegheny City, Pa.		
274	Muhlenberg College	Allentown, Pa.	1867	Rev. E. A. Muhlenberg, D. D.
275	Andalusia College	Andalusia, Pa.	1861	Rev. H. T. Wells, LL. D.
276	Lebanon Valley College	Annaville, Pa.	1866	L. H. Hammond, A. M.
277	Moravian College	Bethlehem, Pa.	1807	Rt. Rev. E. de Schweinitz, D. D.
278	Dickinson College	Carlisle, Pa.	1783	Rev. R. L. Dashiell, D. D.
279	Augustinian College of Villanova	Delaware County, Pa.	1848	Very Rev. P. A. Stanton, O. S. A.
280	Lafayette College	Easton, Pa.	1820	Rev. W. C. Cattell, D. D.
281	Pennsylvania College	Gettysburg, Pa.	1832	M. Valentine, D. D.
282	Franklin and Marshall College	Lancaster, Pa.	1853	Rev. J. W. Nevin, D. D.
283	Lewisburg University	Lewisburg, Pa.	1847	Rev. J. R. Loomis, LL. D.
284	St. Francis College	Loretto, Pa.	1850	Rev. A. J. Brownam
285	Allegheny College	Meadville, Pa.	1815	Rev. G. Loomis, D. D.
286	Mercersburg College	Mercersburg, Pa.	1865	Rev. E. E. Higby, D. D.
287	Palatinate College	Myerstown, Pa.		Rev. H. R. Nicks, A. M.
288	Westminster College	New Wilmington, Pa.	1852	R. A. Brown, D. D.
289	Lincoln University	Oxford, Pa.	1854	Rev. I. N. Rendall, D. D.
290	Maimonides College	Philadelphia, Pa.		
291	Department of Arts, University of Pennsylvania	do	1755	C. J. Stillé, LL. D.
292	La Salle College	do	1862	Brother Oliver
293	St. Joseph's College	do	1852	Rev. P. A. Jordan, S. J.
294	Western University	Pittsburgh, Pa.	1819	G. Woods, LL. D.
295	Lehigh University	South Bethlehem, Pa.	1866	H. Coppee, LL. D.
296	Swarthmore College	Swarthmore, Pa.	1869	E. H. McGill
297	Washington and Jefferson College	Washington, Pa.	1802	Rev. G. P. Hays, D. D.
298	Waynesburg College	Waynesburg, Pa.	1850	A. B. Miller, D. D.
299	Haverford College	West Haverford, Pa.	1833	S. J. Gummers, A. M.
300	St. Vincent's College	Westmoreland County, Pa.	1846	Rev. A. Heimler, O. S. B.
301	Ursinus College	Freeland, Pa.	1869	J. H. A. Bomberger, D. D.
302	Brown University	Providence, R. I.	1764	Rev. A. Caswell, D. D., LL. D.
303	College of Charleston	Charleston, S. C.	1787	N. R. Middleton
304	University of South Carolina	Columbia, S. C.	1801	Hon. R. W. Barnwell, LL. D.
305	Furman University	Greenville, S. C.	1851	J. C. Furman, D. D.
306	Cladlin University	Orangeburg, S. C.	1869	A. Webster, D. D.
307	Wofford College	Spartanburgh C. H., S. C.	1851	Rev. A. M. Shipp, A. M., D. D.
308	Newberry College	Walhalla, S. C.	1859	Rev. J. P. Smetzer, A. M.
309	East Tennessee Wesleyan University	Athens, Tenn.	1867	Rev. N. E. Cobleigh, D. D.
310	King College	Bristol, Tenn.	1869	Rev. J. D. Tadlock

DEPARTMENTS IN THE UNITED STATES, &c.—Continued.

Number.	Denomination.	Students.									Cost of—		Number of volumes in library.	Time of commencement.	
		Number of instructors.	Preparatory department.	Freshmen.	Sophomores.	Juniors.	Seniors.	Other schools not profes- sional.	Males.	Females.	Total.	Tuition per term.			Board per month.
249	U. P.	6							58	13	71	a\$30	\$12-16		Last Thursday in June.
250															
251	Cong.	26	678	61	36	30	40	328	656	517	1173	3	10	10,000	First Wednesday in Aug.
252	State	7	45	17	18	17	19	23	139	139	139	a45	18-20	9,000	Last Thursday in June.
253		4	26	31	14	7	4	25	55	52	107	10	12		Third Wednesday in June.
254	Luth.	1	90	24	19	19	17	8	177	177	177	a30	10	6,000	Last Thursday in June.
255	Ref.	9	120	18	18	5	16		147	30	177	a26	10	4,800	June 21.
256	N. Ch.	2	20	14	10	12	10	70	87	49	136	a10	12		1st Wednesd'y after May 25.
257	U. B.	7	27	33	18	11	4	18	49	62	111	8	12-16	3,000	June 22.
258	Pres.	9	65	12	6	4	3	125	116	99	215	15	16	2,500	Last Wednesday in June.
259	Unit.	8	88	2		4	4	2	62	38	100	a35	a133	4,700	Last Wednesday in June.
260	A. M. E.	7	27					149	39	137	176	5-7	6-12	3,500	June 21.
261	Meth.	2	74	64	46	37	45	151	417		417	12	16	350	June 19.
262	M. E.	9	20	100	21	14		105	50	155	255	a54	14-18	13,036	Last Thursday in June.
263		4						63	29	92	130-200	15	16	500	June 14.
264	U. P.	10						125	44	169	6200-300			500	June 22.
265	Chr.	7	33	4	2	2		57	64	34	98	a33	a180	5,000	First Wednesday in June.
266	Bapt.	13	188	9	10	1	3	45	129	127	256	15	16-2	650	Third Thursday in June.
267	M. E.														
268											70				
269															
270	Luth.	9	16	18	18	13	14	63	142		142	a45	a150	2,800	Last Thursday in June.
271	P. E.	11	55			13	5	4	77		77	b300		400	About the last of June.
272	U. B.	7	20	6	5	5		81	93	24	117	a47	16		Last Thursday but one in June.
273															
274	Mor.														
275	M. E.	8		26	31	20	15	30	125		125	a40	10-16	25,563	Last Thursday in June.
276	R. C.	15							110		110	b250		4,000	Last Wednesday in June.
277															
278	Pres.	25		83	67	32	38	11	231		231	15	20-24	8,000	3d Wednesday in June.
279	Luth.	11	63	34	26	31	23		177		177	13	a137	17,800	Last Thursday in June.
280	G. R.	7	59	17	16	23	14		124	10	134	13	14-18	8,000	Last Thursday in June.
281	Bapt.	6	36	29	15	16	20	40	158		158	a36	12-16	5,000	Last Tuesday in June.
282	R. C.														
283	M. E.	6	25	21	15	11	20		85	7	192		16	12,000	June 20.
284	G. R.	6	63	19	10	8	2	8	96	14	210	b200			2d Wednesday in June.
285	G. R.	6							333	50	243	a32	a154	600	2d Thurslay in June.
286	U. P.	6	52	35	32	16	31	64	166	64	130	a25	8-16	1,500	Last Thursday in June.
287	Pres.	18	71	34	22	18	15		158		158	10	10	28,000	3d Wednesday in June.
288															
289	State	36		31	30	38	26	62	187		187				
290															
291	R. C.	15							212		212	a60-80		3,000	End of June.
292	R. C.	7							340		340		10-15	7,500	1st Monday in July.
293		16		11	27	17	9	153	217		217	18-25	16-24	2,600	Last Tuesday in June.
294	P. E.	15	4	38	13	9	8		116		116	Free	20	2,000	Last Thursday in June.
295	Fr.		173	30	18	7			134	94	228	b350		8,000	Last Wednesday in June.
296	Pres.	10	39	30	14	16	19		118		118	8	9-16		Wednesday before July 3.
297															
298	C. P.	10							275		275	a12	12-14		2d Thursday in September.
299	Fr.	5		8	10	20	13		51		51			7,857	July 12.
300	R. C.	22	23					204	227		227	10	16	6,000	Last Wednesday in June.
301	Ref.	6	98	13	3	6			120		120	a48	15		Last Thursday in June.
302	Bapt.	13		56	78	41	50		225		225	a75	13-32	38,000	Last Wednesday in June.
303		5							50		50	a40		8,000	Last Tuesday in March.
304	State	14							70		70	a45	14	27,000	Last Monday in June.
305	Bapt.	4							50		50				
306	M. E.	6							73	30	103			200	
307	M. E. S.	7	42	22	24	22	15	11	136		136	32	15	2,000	Last Wednesday in June.
308	Luth.	4	79	2	3	2			86		86	a45	12		Last Thursday in June.
309	M. E.	9	35	14	11	5	5	73	100	43	143	a46	12	300	2d Wednesday in June.
310		6							162		162	20	14		Last Wednesday but one in May.

STATISTICS OF COLLEGES AND COLLEGIATE

Number.	Name.	Location.	Date of organization.	President.
312	Greenville and Tusculum College.	Greenville, Tenn.	1869	Rev. W. S. Doak, A. M.
313	West Tennessee University	Jackson, Tenn.	.....	Rev. E. L. Patton, A. M.
314	Jonesborough College	Jonesborough, Tenn.	1865	H. Presnell, A. M.
315	East Tennessee University	Knoxville, Tenn.	1807	Rev. T. W. Humes, S. T. D.
316	Presbyterian Synodical College	Lagrange, Tenn.	1856	.....
317	Cumberland University	Lebanon, Tenn.	1842	B. W. McDonald, D. D., LL. D.
318	Lookout Mountain Educational Institution.	Lookout Mountain, Tenn.	1866	Rev. C. F. P. Bancroft, A. M.
319	Hiwassee College	Madisonville, Tenn.	.....	J. B. Greiner, A. M.
320	Maryville College	Maryville, Tenn.	1819	Rev. P. M. Bartlett, A. M.
321	Union University	Murfreesborough, Tenn.	1848	G. W. Jarman, A. M.
322	Central Tennessee College	Nashville, Tenn.	1866	Rev. J. Braden, A. M.
323	College of Arts, University of Nashville.	do	1806	E. K. Smith
324	Fisk University	do	1867	A. K. Spence, A. M.
325	Franklin College	Near Nashville, Tenn.	1844	A. J. Fanning
326	University of the South	Sewanee, Tenn.	1862	Gen. Gorgas
327	St. Joseph's College	Brownsville, Texas	.....	.....
328	Colorado College	Columbus, Texas	1857	Rev. J. J. Scherer, A. M.
329	University of St. Mary	Galveston, Texas	1856	Brother Boniface, S. S. C.
330	Aranama College	Goliad, Texas	1852	J. E. C. Doremus, D. D.
331	Henderson College	Henderson, Texas	1871	G. H. Gould
332	Baylor University	Independence, Texas	1845	W. C. Crane, D. D.
333	St. Mary's College	San Antonio, Texas	.....	.....
334	Waco University	Waco, Texas	1861	Rev. R. C. Burleson, D. D.
335	University of Vermont	Burlington, Vt.	.....	M. H. Buckham
336	Middlebury College	Middlebury, Vt.	1797	Rev. H. D. Kitchel, D. D.
337	Norwich University	Northfield, Vt.	1831	Rev. R. S. Howard, D. D.
338	Randolph Macon College	Ashland, Va.	1831	Rev. J. A. Duncan, A. M., D. D.
339	University of Virginia	Univ. of Va. P. O.	1825	C. S. Venable, LL. D.
340	Emory and Henry College	Emory, Va.	1835	Rev. E. E. Wiley, D. D.
341	Washington and Lee University.	Lexington, Va.	1782	Gen. G. W. C. Lee
342	Hamptden Sidney College	Prince Edward County, Va.	1776	B. Puryear, A. M.
343	Richmond College	Richmond, Va.	1844	B. Puryear, A. M.
344	Roanoke College	Salem, Va.	1853	Rev. D. F. Bittle, D. D.
345	College of William and Mary	Williamsburgh, Va.	1693	B. S. Ewell
346	Virginia Military Institute	Lexington, Va.	1839	Gen. F. H. Smith
347	St. John's College	Norfolk, Va.	.....	.....
348	Bethany College	Bethany, W. Va.	1841	W. K. Pendleton
349	West Virginia University	Morgantown, W. Va.	1868	Rev. A. Martin, D. D.
350	St. Vincent's College	Wheeling, W. Va.	1865	Rev. A. Louage
351	West Virginia College	Flemington, W. Va.	.....	Rev. W. Colegrove, A. M.
352	Lawrence University	Appleton, Wis.	1847	Rev. G. M. Steele, D. D.
353	Wayland University	Beaver Dam, Wis.	1854	A. S. Hutchens
354	Beloit College	Beloit, Wis.	1847	Rev. A. L. Chapin, D. D.
355	Galesville University	Galesville, Wis.	1859	Rev. H. Gilliland, A. M.
356	Janesville College	Janesville, Wis.	.....	A. L. Reed
357	University of Wisconsin	Madison, Wis.	1848	J. H. Twombly, D. D.
358	.....	.....	.....	.....
359	Pio Nono College	St. Francis, Wis.	1871	Rev. J. Salzmann, D. D.
360	Milton College	Milton, Wis.	1844	Rev. W. C. Whitford, A. M.
361	Racine College	Racine, Wis.	1852	Rev. J. De Koven, D. D.
362	Ripon College	Ripon, Wis.	1863	Rev. W. E. Merriman, A. M.
363	St. John's College	Prairie du Chien, Wis.	1865	Brother Benedict
364	Northwestern University	Watertown, Wis.	1864	Rev. A. F. Ernest, A. M.
365	Carroll College	Waukesha, Wis.	1846	Rev. W. D. F. Lummis, A. M.
366	Georgetown College	Georgetown, D. C.	1792	Rev. J. Early, S. J.
367	Columbian College	Washington, D. C.	1822	J. C. Welling, LL. D.
368	Gonzaga College	do	1848	Rev. J. Clark
369	Howard University	do	1867	Gen. O. O. Howard, LL. D.
370	Santa Fé University	Santa Fé, N. M.	1870	Rev. D. F. McFarland
371	University of Deseret	Salt Lake City, Utah	1868	J. R. Park, M. D.
372	Washington University	Seattle, Wash. Ter.	1831	J. H. Hall

DEPARTMENTS IN THE UNITED STATES, &c.—Continued.

Number.	Denomination.	Students.								Cost of—		Number of volumes in library.	Time of commencement.		
		Number of instructors.	Preparatory department.	Freshmen.	Sophomores.	Juniors.	Seniors.	Other schools not professional.	Males.	Females.	Total.			Tuition per term.	Board per month.
312	Pres	5							65	65					
313	M. E.	3							5	60	65				
314	M. E.	12	113	26	15	9	4		167	167	a\$36	\$8	1,000	3d Wednesday in June.	
315	Pres	9	100	33	29	25	22		30	239	a60-70	14-20		2d Thursday in June.	
316	C. P.	6	44	6	2				53	79	b200			3d Tuesday in June.	
317	Luth	6	24	8		4	5	59	71	29	100	a20	8-12	2,000	Last Thursday in May.
318	Pres	6	9						211	115	105	a9	10-12	453	May 17.
319	Bapt	10		15	10	5	2	239	271	271	b150-175			10,000	2d Tuesday in June.
320	M. E.	7							524	524					
321	State	8							180	180					
322	Cong	9	78						84	162	162	3-6	c30	500	Last Thursday in June.
323	Chr	7							173	142	315	a130			September 4.
324	P. E.	6							113	113	a30-60	12-50	2,500	2d Wednesday in June.	
325	Luth	11							236	140	105	15-25	12-15		Last Week in June.
326	R. C.	15	11	7	14	13	24	69	69	69	a45	14-16	15,000	1st Thursday in August.	
327	Bapt	7	14	10	18	16		58	58	58	a45	a142	11,000	Thursday following 2d Wednesday in August.	
328	P. E.	10	12	24	30	8		74	74	74	b350		4,000	2d Thursday in July.	
329	M. E. S.	7						142	142	142	a40-75	10-18	10,000	Last Thursday in June.	
330	State	19						317	317	317	70	16-20	37,000	Thursday before July 4.	
331	M. E. S.	5	88	27	25	25	15	180	180	180	a60	13	13,580	1st Wednesday in June.	
332	M. E. S.	22						305	305	305	a60	16	6,000	4th Thursday in June.	
333	Pres	5	18	16	21	10		16	81	81	a50	a160	3,500	2d Thursday in June.	
334	Bapt	11	69	11	14	16	7	144	144	144	a70	10		July 1.	
335	Luth	11	69	11	14	16	7	34	151	151	a50	a140-205	6,600	3d Wednesday in June.	
336	P. E.	12						76	76	76	50	16	5,000	3d Monday in June.	
337	State	9						386	386	386	Free	15		July 4.	
338	R. C.	9	22	16	11	15		43	107	107	a30	20		3d Thursday in June.	
339	Chr	13	99	25	8	12	2	146	146	146	5-8	16	1,500	3d Wednesday in June.	
340	State	12						120	120	120	a30	a200	3,500	1st Monday in September.	
341	R. C.	10						42	28	76	6-8	12		July 12.	
342	M. E.	9	57	29	24	11	13	138	185	87	272	5-7	8-11	6,000	Last Thursday in June.
343	Bapt	5							197	197	a25				
344	Cong	9	133	14	20	14	11	5	197	197	a36	a80-160	7,200	2d Wednesday in July.	
345	M. E.	5						62	44	106	a21-30		4,500		
346	M. E.	3						161	22	183					
347	State	27	131	7	5	10	6	303	338	124	462	6	12	5,000	Wednesday preceding last Tuesday in June.
348	R. C.	5						26	26	26	a160		7,200	July 1.	
349	Bapt	7	163	32	26	10	6	141	96	237	8-11	13	1,310	Last Wednesday in June.	
350	P. E.	10	131	13	21	4	7	9	185	185	b400				2d Wednesday in July.
351	Pres	12	54	6	5	5	7	244	174	147	321	8	10	1,500	Last Wednesday in June.
352	R. C.	15						130	130	130					
353	Luth	7						128	4	132	10	a120-150	1,500	July 4.	
354	Pres	16	139	36	15	11	11	212	212	212	b325		33,000	Last Thursday in June.	
355	R. C.	9	70	13	8	8	10	199	109	109	a60	16	8,000	Last Wednesday in June.	
356	Bapt	8						143	143	143	a44		400	1st Monday in July.	
357	R. C.	4													
358	Cong	13						34	17	51	40-60	a225	40	September 11.	
359	Pres	4						286	294	580	a60	20-32		June 14.	
360	L. D. S.	5						116	88	198	14	14	400		

STATISTICS OF THEOLOGICAL

[Compiled from the most recent reports sent]

Number.	Name.	Location.	Date of organization.	Denomination.
1	Theological department of Howard College.	Marion, Ala.	1841	Baptist
2	Ecclesiastical Seminary of Diocese of Mobile.	South Orange, Ala.		Roman Catholic.
3	Saint Augustine College.	Benicia, Cal.	1868	Protestant Episcopal.
4	Theological Seminary.	San Francisco, Cal.	1871	Presbyterian
5	Pacific Theological Seminary.	Oakland, Cal.	1866	Congregational
6	Theological Institute of Connecticut.	Hartford, Conn.	1834	do
7	Theological department of Yale College.	New Haven, Conn.	1823	do
8	Berkeley Divinity School.	Middletown, Conn.	1854	Protestant Episcopal.
9	Theological department of Mercer University.	Macon, Ga.	1833	Baptist
10	St. Joseph's Ecclesiastical College.	Teutopolis, Ill.	1861	Roman Catholic.
11	Theological Seminary of the Northwest.	Monmouth, Ill.	1839	United Presbyterian.
12	Theological school of Blackburn University.	Carlinville, Ill.	1857	Presbyterian.
13	Garrett Biblical Institute.	Evanston, Ill.	1854	Methodist Episcopal.
14	Chicago Theological Seminary.	Chicago, Ill.	1855	Congregational
15	Theological Seminary of the Northwest.	do	1859	Presbyterian.
16	Baptist Theological Seminary.	do	1866	Baptist
17	Bible department of Eureka College.	Eureka, Ill.	1852	Christian
18	Theological department of Shurtleff College.	Upper Alton, Ill.	1832	Baptist
19	Theological department of Augustana College.	Geneseo, Ill.		Lutheran
20	Theological School of Hartsville University.	Hartsville, Ind.		United Brethren.
21	Wauburg Seminary.	St. Sebald, Iowa.	1857	Lutheran
22	Theological department of Griswold College.	Davenport, Iowa.	1859	Protestant Episcopal.
23	German Theological Seminary.	Dubuque, Iowa.		Presbyterian.
24	Theological Department of Iowa Wesleyan University.	Mt. Pleasant, Iowa.	1858	Methodist Episcopal.
25	Norwegian Theological Seminary.	Decorah, Iowa.		Lutheran.
26	Theological department of Georgetown College.	Georgetown, Ky.		Baptist.
27	Western Baptist Theological Institute.	do	1840	do
28	St. Joseph's Ecclesiastical Seminary.	Bardstown, Ky.	1820	Roman Catholic.
29	College of the Bible, of Kentucky University.	Lexington, Ky.	1865	Christian
30	Danville Theological Seminary.	Danville, Ky.	1853	Presbyterian.
31	Diocesan Theological Seminary.	Shelbyville, Ky.	1865	Protestant Episcopal.
32	Theological school of Bethel College.	Russellville, Ky.	1858	Baptist
33	Thomson Biblical Institute.	New Orleans, La.	1865	Methodist Episcopal.
34	Theological Seminary.	do		Roman Catholic.
35	Theological Seminary.	Bangor, Me.	1816	Congregational
36	Theological school of Bates College.	Lewiston, Me.	1830	Free Baptist.
37	Theological Seminary of St. Sulpice.	Baltimore, Md.	1791	Roman Catholic.
38	Theological department of Mt. St. Mary's College.	Near Emmittsburg, Md.	1800	do
39	Theological Seminary.	Woodstock, Md.		do
40	Divinity school of Tufts College.	College Hill, Mass.	1868	Universalist.
41	Divinity school of Harvard University.	Cambridge, Mass.	1811	No tests.
42	Boston Theological Seminary.	Boston, Mass.	1847	Methodist Episcopal.
43	Andover Theological Seminary.	Andover, Mass.	1808	Congregational
44	Episcopal Theological School.	Cambridge, Mass.	1867	Protestant Episcopal.
45	Newton Theological Institution.	Newton Centre, Mass.	1826	Baptist
46	New Jerusalem Theological School.	Waltham, Mass.	1866	New Jerusalem Church.
47	Theological department of Adrian College.	Adrian, Mich.		
48	Theological department of Hillsdale College.	Hillsdale, Mich.		Free Baptist.
49	Scandinavian Theological Seminary.	Chicago, Ill.		Lutheran
50	Concordia Seminary.	St. Louis, Mo.	1840	do
51	Vanderman School of Theology.	Liberty, Mo.	1868	Baptist
52	Theological school of Westminster College.	Fulton, Mo.		
53	St. Vincent's Theological Seminary.	Cape Girardeau, Mo.	1844	Roman Catholic.
54	Theological Seminary of the Reformed Church.	New Brunswick, N. J.	1785	Reformed.

SEMINARIES IN THE UNITED STATES.

to the United States Bureau of Education.]

Number.	President or senior professor.	No. of professors.	No. of students.	Whole number educated.	Amount of endowment.	Number of volumes in library.	Estimated annual expense of each student.	Time of commencement.
1	Rev. S. R. Freeman, D. D.	1	4			2,500	\$105	Last Thursday in June.
2								
3	Rt. Rev. Wm. I. Kip, D. D.	6	7					
4								
5	Rev. James A. Benton, D. D.	3	2	2	\$50,000	1,500	150	3d Thursday of August.
6	William Thompson, D. D.	3	225	220		7,000	80	Last Thursday in June.
7	Nash Porter, D. D., LL. D.	7	865	865	308,000			3d Thursday in May.
8	Rt. Rev. John Williams, D. D., LL. D.	10	38	149	40,000			1st week in June.
9	Henry H. Tucker, D. D.							
10	Very Rev. P. Maurice Klosterman, O. S. F.	7	106	527		700	180	
11	Rev. Alexander Young, D. D.	3	15	208	15,000	2,050	150-175	Last Thursday in March.
12	Rev. John W. Bailey, D. D.	1	20		16,000	700	180	
13	H. Bannister, D. D.	4	90	256	300,000	3,300	150	Last Thursday in June.
14	Rev. S. C. Bartlett, D. D.	6	55	125	100,000	3,700	150	Last Thursday in June.
15				171	100,000	8,000	125-150	1st Thursday in April.
16					112,000	10,000	150	
17								2d Thursday in June.
18	Rev. J. Bulkley, D. D.	3			65,000		150	Do.
19	Rev. T. N. Hasselquist	2	18					
20	Rev. J. Woodbury Scribner, A. M.	1	7				93-150	2d Tuesday in June.
21				67	3,400	1,045		
22	Rt. Rev. Henry W. Lee, D. D., LL. D.	2	7	15	40,000	5,000	250	3d week in June.
23	Rev. J. Conzet	2	16	75	10,000	5,000	150	June 1st.
24	John Wheeler, D. D.	1						
25								
26	Rev. N. M. Crawford	1					200-250	2d Thursday in June.
27								
28	Rev. P. de Fraine	7	68			3,000	150	Last Tuesday in June.
29	Rev. Robert Milligan.	2	122	110			125	2d Friday in June.
30				194	218,000	8,000		31st October.
31								2d Thursday in June.
32								
33								
34		2	30					
35	Rev. Enoch Pond, D. D.	4	24	640	120,000	13,000	150	1st Thursday in June.
36	Rev. Oren B. Cheney, D. D.	4	21			2,000		Tuesday before the last Wednesday in June.
37		6	70					July 1st.
38	Very Rev. Jno. McCaffrey, D. D.	3	29	320		15,000	150	3d Monday in June.
39		7	75					
40	Rev. Alonzo A. Miner, D. D.	3	20			12,000	250	
41	Charles W. Eliot, LL. D.	5	37	432	240,000	16,000	300	Last Tuesday in June.
42	Rev. William F. Warren, D. D.	14	90	665	250,000	4,000	140	2d Wednesday in June.
43	Rev. Edwards A. Park, D. D.	11	88	2,606		30,000	156	1st Thursday in August.
44	Rev. John S. Stone, D. D.	4	11		125,000		350	1st Wednesday in July.
45	Rev. Alvah Hovey, D. D.	5	50	530	335,000	1,200	200	2d Wednesday in June.
46	Rev. Thomas Worcester	4	8	9	27,000	500	175	Not fixed.
47	Rev. A. Mahan, D. D.							
48	Rev. James Calder, D. D.	4	32					
49								
50	Rev. C. F. W. Walter	4				5,000		1st September.
51	Rev. T. Rambaut, D. D.	4	52		60,000	3,000	310	1st Wednesday in June.
52	Rev. Nathan L. Rice, D. D.	3	6					
53	Rev. J. Alizeri							
54	Rev. Samuel M. Woodbridge.	4	22	779	175,000	16,000	300	September 20.

STATISTICS OF THEOLOGICAL SEM

Number.	Name.	Location.	Date of organization.	Denomination.
55	Theological Seminary	Princeton, N. J.	1812	Presbyterian
56	Drew Theological Seminary	Madison, N. J.	1867	Methodist Episcopal
57	Auburn Theological Seminary	Auburn, N. Y.	1821	Presbyterian
58	Rochester Theological Seminary	Rochester, N. Y.	1850	Baptist
59	Union Theological Seminary	New York City, N. Y.	1836	Presbyterian
60	Hartwick Theological Seminary	Hartwick, N. Y.	1816	Lutheran
61	Theological seminary of Madison University	Hamilton, N. Y.	1820	Baptist
62	Theological school of St. Lawrence University	Canton, N. Y.	1858	Universalist
63	Martin Luther (theological) College	Buffalo, N. Y.	1854	Lutheran
64	Newburgh Theological Seminary	Newburgh, N. Y.	1855	United Presbyterian
65	St. Joseph's Provincial Seminary	Troy, N. Y.	1824	Roman Catholic
66	Theological Seminary	New York City, N. Y.	1817	Protestant Episcopal
67	De Lancy Divinity School	Geneva, N. Y.	1861	do
68	Theological Seminary of Our Lady of Angels	Suspension Bridge, N. Y.	1856	Roman Catholic
69	Theological school of Trinity College	Trinity College, N. C. ....	.....	Methodist Episcopal
70	Biblical department of Baldwin University	Berea, Ohio .....	.....	do
71	Theological Seminary	Gambier, Ohio	1823	Protestant Episcopal
72	Theological school of Ohio Wesleyan University	Delaware, Ohio .....	.....	Methodist Episcopal
73	Theological department of Wilberforce University	Near Xenia, Ohio	1861	African Methodist Episcopal
74	Theological department of Oberlin College	Oberlin, Ohio	1835	Congregational
75	Heidelberg Theological Seminary	Tiffin, Ohio	1853	Reformed
76	Theological seminary of St. Charles Borromeo	Carthage, Ohio	1869	Roman Catholic
77	Wittenberg College	Springfield, Ohio	1845	Lutheran
78	Mount Saint Mary's of the West	Cincinnati, Ohio	1849	Roman Catholic
79	Lane Theological Seminary	do	1829	Presbyterian
80	Theological department of Capital University	Columbus, Ohio .....	.....	Lutheran
81	Theological Seminary	Xenia, Ohio	1794	United Presbyterian
82	St. Mary's Ecclesiastical Seminary	Cleveland, Ohio .....	.....	Roman Catholic
83	Cruzer Theological Seminary	Upland, Pa.	1854	Baptist
84	Meadville Theological School	Meadville, Pa.	1844	Unitarian
85	Theological Seminary	Lancaster, Pa.	1825	Reformed
86	Divinity School	Philadelphia, Pa.	1862	Protestant Episcopal
87	Lutheran Theological Seminary	do	1864	Lutheran
88	Missionary Institute	Selin's Grove, Pa.	1878	do
89	Western Theological Seminary	Allegheny City, Pa.	1825	Presbyterian
90	Theological Seminary	do .....	.....	United Presbyterian
91	Biblical department of Allegheny College	Meadville, Pa. ....	.....	.....
92	Theological department of Lincoln University	Oxford, Pa.	1865	Presbyterian
93	Chair of Biblical language and literature, Dickinson College	Carlisle, Pa. ....	.....	Methodist Episcopal
94	Theological Seminary	Bethlehem, Pa.	1807	Moravian
95	St. Michael's Theological Seminary	Pittsburgh, Pa.	1847	Roman Catholic
96	Theological Seminary	Gettysburg, Pa.	1825	Lutheran
97	Protestant Episcopal Mission House	West Philadelphia, Pa.	1844	Protestant Episcopal
98	St. Charles Borromeo Seminary	Philadelphia, Pa.	1858	Roman Catholic
99	Theological Seminary of Ursinus College	Fredland, Pa.	1870	.....
100	Theological Seminary	Columbia, S. C.	1831	Presbyterian
101	Theological Seminary	do	1879	Lutheran
102	Southern Baptist Theological Seminary	Greenville, S. C.	1859	Baptist
103	Theological department of Cumberland University	Lebanon, Tenn.	1812	Presbyterian
104	Theological department of Central University	Nashville, Tenn.	1866	Methodist Episcopal
105	Theological department of Baylor University	Independence, Tex.	1864	Baptist
106	Colyer Institute	Richmond, Va.	1867	do
107	Union Theological Seminary	Hampton Sidney, Va.	1824	Presbyterian

TABLES IN THE UNITED STATES—Continued.

Number.	President or senior professor.	Number of professors.	Number of students.	Whole number educated.	Amount of endowment.	Number of volumes in library.	Estimated annual expense of each student.	Time of commencement.
55	Rev. Charles Hodge, D.D., LL.D.	6	122	2,927	\$50,000	21,804	\$175	Last Wednesday in April.
56	Rev. John S. Foster, D.D., LL.D.	5	97	189	500,000	10,000	150	3d Thursday in May.
57	S. M. Hopkins, D.D.	5	40	.....	.....	8,500	250	Thursday after 1st Sunday in May.
58	Rev. E. G. Robinson, D.D.	5	71	476	267,000	8,000	175	3d week in May.
59	Rev. Henry B. Smith, D.D., LL.D.	6	117	935	375,000	30,000	250	Monday before 2d Thursday in May.
60	Rev. T. T. Titus, A. M.	1	2	160	15,000	2,000	175	4th Wednesday in June.
61	Rev. Geo. W. Eaton, D.D., LL.D.	4	22	200	180,000	10,000	200	3d Tuesday in June.
62	Rev. Ebenezer Fisher, D.D.	3	27	142	60,000	6,000	240	1st Thursday in July.
63	Rev. J. A. A. Grabau	5	12	.....	.....	.....	.....	.....
64	A board of superintendents	2	12	.....	30,000	3,400	160	Last Wednesday in March.
65	Very Rev. H. Gabriels	7	130	260	.....	.....	225	Last Thursday in June.
66	.....	6	.....	812	200,000	13,845	400-500	Thursday in June.
67	Rev. James Rankine, D.D.	5	.....	.....	20,000	.....	.....	.....
68	Very Rev. Robert E. V. Rice	4	50	150	.....	3,500	262	Last Wednesday in June.
69	Rev. B. Craven, D.D.	1	28	20	.....	400	125	Last Thursday in June.
70	Rev. W. D. Godman, D.D.	.....	.....	.....	.....	.....	.....	.....
71	Rev. C. P. McVaine, D.D., D. C. L., LL.D.	4	15	161	100,000	7,000	300	Last Thursday in June.
72	Rev. Frederick Merrick	3	.....	.....	.....	.....	.....	.....
73	Rt. Rev. Daniel A. Payne, D.D.	2	18	4	.....	.....	150	Third Wednesday in June.
74	Rev. James H. Fairchild, D.D.	5	47	288	60,000	10,000	150-225	1st Wednesday in August.
75	Rev. J. H. Good, D.D.	2	18	130	21,000	2,400	175	Last Wednesday in June.
76	Rev. Henry Drees, D.D.	3	27	.....	.....	3,500	Free	4th week in June.
77	Rev. S. Sprecher, D.D.	1	6	109	.....	.....	150	June 30.
78	Rev. F. J. Pabisch, D.D., LL.D., D. C. L.	3	33	.....	160,000	10,000	225	June 24.
79	Rev. Henry Smith, D.D.	5	40	533	200,000	12,000	150	2d Thursday in May.
80	.....	.....	.....	.....	.....	.....	.....	.....
81	Rev. S. Wilson, D.D.	3	15	376	50,000	2,000	100-150	1st Thursday in October.
82	.....	.....	.....	.....	.....	.....	.....	.....
83	Rev. Henry G. Weston, D.D.	.....	.....	.....	.....	.....	.....	.....
84	Rev. A. A. Livermore	6	21	166	140,000	11,000	225	3d Thursday in June.
85	Rev. E. V. Gerhart, D.D.	3	23	270	60,000	8,000	200	Last Wednesday in May.
86	Rev. D. R. Goodwin, D.D., LL.D.	5	45	133	.....	6,100	250-300	Thursday after 3d Tuesday in June.
87	Rev. Charles F. Schaeffer, D.D.	4	38	52	88,000	1,800	240	Week before Trinity Sunday.
88	H. Zeigler	4	17	52	.....	2,000	.....	Week before Trinity Sunday.
89	Rev. M. W. Jacobus, D.D., LL.D.	7	75	1,005	184,000	.....	200	Last Wednesday in April.
90	.....	.....	.....	.....	.....	.....	.....	.....
91	Rev. George Loomis, D.D.	.....	.....	.....	.....	.....	.....	.....
92	Rev. I. N. Rendall, D.D.	5	6	.....	.....	.....	98-113	3d Wednesday in June.
93	Rev. Robert L. Dashiell, D.D.	1	11	.....	.....	.....	.....	.....
94	Rt. Reverend Edmund de Schweinitz, D.D.	4	20	233	42,000	4,100	200	1st Wednesday in Sept.
95	Rev. S. Wall	5	60	130	.....	4,000	200	Last of June.
96	Rev. J. A. Brown, D.D.	5	28	46	100,000	12,000	150	4th Thursday in June.
97	Rev. Washington Rodman	3	9	30	.....	600	300	3d Thursday in September.
98	.....	.....	.....	.....	.....	10,000	300	1st Monday in September.
99	Rev. J. H. A. Bomberger	3	.....	.....	.....	.....	200	Last Thursday in June.
100	Rev. George Howe, D.D.	7	41	374	145,715	18,340	150	2d week in May.
101	Rev. A. R. Rude	2	.....	29,000	4,000	.....	150	1st Thursday in October.
102	Rev. James P. Boyce, D.D.	5	51	185	50,000	10,000	110	Last Saturday in April.
103	Rev. B. W. McDonnell, D.D., LL.D.	2	8	40	35,000	5,000	100	1st Thursday in June.
104	Rev. J. Braden, A. M.	1	6	.....	.....	400	100	3d week in May.
105	Rev. Wm. Carey Crane, D.D.	1	21	.....	.....	400	100	3d Thursday in June.
106	Rev. Charles H. Corey, A. M.	2	73	.....	.....	1,000	60	3d week in May.
107	Rev. R. L. Labney, D.D.	4	59	400	196,000	8,000	250-300	2d Tuesday in May.

STATISTICS OF THEOLOGICAL SEM

Number.	Name.	Location.	Date of organization.	Denomination.
109	Theological Seminary	Fairfax County, Va. . .	1823	Protestant Episcopal..
109	St. John's Theological Seminary.....	Norfolk, Va.	1869	Roman Catholic.....
110	New Hampton Theological Seminary.....	Fairfax, Va.	1825	Baptist
111	St. Vincent's College	Wheeling, W. Va.	1865	Roman Catholic.....
112	Nashotah Theological Seminary	Nashotah Lakes, Wis.	1847	Protestant Episcopal..
113	Mission House	Howard's Grove, Wis.	1864	Reformed
114	The Salesianum	St. Francis, Wis.	1856	Roman Catholic.....
115	Augsburg Seminary.....	Marshall, Wis.	1869	Lutheran
116	Theological department of Howard Uni- versity.	Washington, D. C.	1870	Union Evangelical....
117	Wayland Theological Seminary	do	1865	Baptist

UNIVERSITIES IN THE UNITED STATES—Continued.

Number.	President or senior professor.	Number of professors.	Number of students.	Whole number educated.	Amount of endowment.	Number of volumes in library.	Estimated annual expense of each student.	Time of commencement.
108	Rt. Rev. John Johns, D.D., LL.D.	3	45	599	.....	9,500	\$200	Last Thursday in June.
109	Rev. M. O'Keefe.....	3	10	3	.....	3,000	150-250	Second Thursday in July.
110	.....	3	12	56	.....	1,500	.....	.....
111	Rev. A. Lonaze.....	3	54	216	.....	5,000	.....	June 29.
112	Rev. A. D. Cole, D.D.....	4	15	35	\$100	1,400	50	First Monday in Sept.
113	Rev. H. A. Muehlmeier.....	3	172	416	.....	7,200	150-180	July 1.
114	Rev. Joseph Salzmann, D.D.....	12	20	6	.....	1,000	100	.....
115	Rev. A. Weenaas, A. M.....	3	12	.....	.....	.....	150	Last Tuesday in June.
116	Gen. O. O. Howard.....	12	45	.....	.....	250	75	Last Wednesday in May.
117	Rev. G. M. P. King.....	2	.....	.....	.....	.....	.....	.....

Number	Name	Location	
		City or town	State
1	Albany Law School	Albany	N. Y.
2	Brooklyn Law School	Brooklyn	N. Y.
3	Columbia Law School	New York	N. Y.
4	Concord Law School	Concord	N. H.
5	Dartmouth Law School	Hanover	N. H.
6	Harvard Law School	Cambridge	Mass.
7	Yale Law School	New Haven	Conn.
8	University of Michigan Law School	Ann Arbor	Mich.
9	University of Wisconsin Law School	Madison	Wis.
10	University of Illinois Law School	Urbana	Ill.
11	University of Minnesota Law School	St. Paul	Minn.
12	University of Nebraska Law School	Lincoln	Nebr.
13	University of Kansas Law School	Lawrence	Kans.
14	University of Colorado Law School	Boulder	Colo.
15	University of Arizona Law School	Tucson	Ariz.
16	University of California Law School	Berkeley	Calif.
17	University of Oregon Law School	Eugene	Ore.
18	University of Washington Law School	Seattle	Wash.
19	University of Idaho Law School	Boise	Idaho
20	University of Montana Law School	Helena	Mont.
21	University of Wyoming Law School	Laramie	Wyo.
22	University of Nevada Law School	Reno	Nev.
23	University of Utah Law School	Salt Lake City	Utah
24	University of Arizona Law School	Tucson	Ariz.
25	University of California Law School	Berkeley	Calif.
26	University of Oregon Law School	Eugene	Ore.
27	University of Washington Law School	Seattle	Wash.
28	University of Idaho Law School	Boise	Idaho
29	University of Montana Law School	Helena	Mont.
30	University of Wyoming Law School	Laramie	Wyo.
31	University of Nevada Law School	Reno	Nev.
32	University of Utah Law School	Salt Lake City	Utah
33	University of Arizona Law School	Tucson	Ariz.
34	University of California Law School	Berkeley	Calif.
35	University of Oregon Law School	Eugene	Ore.
36	University of Washington Law School	Seattle	Wash.
37	University of Idaho Law School	Boise	Idaho
38	University of Montana Law School	Helena	Mont.
39	University of Wyoming Law School	Laramie	Wyo.
40	University of Nevada Law School	Reno	Nev.
41	University of Utah Law School	Salt Lake City	Utah
42	University of Arizona Law School	Tucson	Ariz.
43	University of California Law School	Berkeley	Calif.
44	University of Oregon Law School	Eugene	Ore.
45	University of Washington Law School	Seattle	Wash.
46	University of Idaho Law School	Boise	Idaho
47	University of Montana Law School	Helena	Mont.
48	University of Wyoming Law School	Laramie	Wyo.
49	University of Nevada Law School	Reno	Nev.
50	University of Utah Law School	Salt Lake City	Utah

SCHOOLS IN THE UNITED STATES.

Number.	When founded.	President or senior professor.	Number of professors.	Number of students.	Number of alumni.	Number of vols. in library.	Time of commencement.
1	1843	Neah Porter, D. D., LL. D.	4	23	2	150	Last Thursday but two in July.
2	1867	A. A. Lipscomb, D. D.	3	19	.....	731	August 2d.
3	1859	J. C. Burroughs, D. D., LL. D.	4	52	21	.....	Last Thursday in June.
4	1860	Henry H. Hemen, A. M.	1	5	23	850	First Thursday in June.
5	1843	David McDonald, LL. D.	12	53	229	1,099	.....
6	1870	Horatio C. Newcomb, LL. D.	12	11	.....	.....	27th day of March.
7	.....	Rev. W. Corby, S. S. C.	6	.....	.....	.....	.....
8	1855	George Thayer, LL. D.	3	50	91	2,000	Last Thursday in June.
9	1871	John W. Alden, D. D.	4	.....	12	.....	June 18.
10	1860	Marshall C. Johnson, LL. D.	3	24	.....	1,000	.....
11	1842	Christian R. Schuch, LL. D.	4	54	853	3,000	First Monday in April.
12	1847	Charles W. Eliot, LL. D.	7	154	1,629	15,000	Last Wednesday in June.
13	1854	John N. W. Hall, D. D.	2	7	.....	500	.....
14	1859	James B. Angell, LL. D.	4	321	1,000	3,100	.....
15	1857	Henry R. ... A. M.	9	53	33	2,000	Second Monday in May.
16	1851	Isa. H. ... LL. D.	3	86	.....	.....	.....
17	.....	Henry F. Davis, LL. D.	4	.....	.....	.....	.....
18	1850	F. A. P. ... LL. D.	6	59	600	.....	.....
19	1853	S. G. Brown, D. D., LL. D.	1	14	65	5,000	Thursday after last Tuesday in June.
20	1856	Richmond Pisk jr., D. D.	2	11	15	600	.....
21	.....	Richmond Pisk, D. D.	1	.....	.....	.....	.....
22	1850	Richard S. ... LL. D.	2	23	.....	2,500	.....
23	1850	John C. ... LL. D.	2	.....	.....	.....	.....
24	1850	R. F. Howard, A. M., B. L.	1	.....	.....	.....	.....
25	1850	E. Spencer Miller, A. M.	2	62	.....	.....	.....
26	1871	George W. ... LL. D.	3	.....	.....	.....	.....
27	1854	J. N. ... LL. D.	9	3	.....	.....	.....
28	1854	John H. Graham, LL. D.	1	12	.....	.....	First Thursday in September.
29	1847	R. W. Bagwell, LL. D.	1	3	.....	.....	.....
30	.....	William P. ... LL. D.	3	.....	.....	.....	.....
31	1842	R. W. McDonald, LL. D.	2	26	.....	.....	.....
32	1845	William Carey Crane, D. D.	4	10	.....	.....	First Wednesday in June.
33	1850	B. ... A. M.	2	13	8	.....	First Wednesday in July.
34	.....	J. W. ... LL. D.	2	31	.....	.....	.....
35	1855	John B. Miner, LL. D.	2	117	.....	.....	Thursday before 4th of July.
36	1862	H. S. ... LL. D.	6	23	.....	.....	.....
37	1856	J. C. Welling, LL. D.	5	167	.....	.....	.....
38	1858	John M. Langston, A. M.	3	55	13	.....	.....
39	1870	Rev. John Early, S. J.	3	25	.....	.....	June 5.
40	1870	W. B. Wedgwood, LL. D.	3	87	.....	.....	Last Thursday in May.

STATISTICS OF MEDICAL, DENTAL, AND

Number.	Name.	Location.	Date of organization.	Matriculation fee.	Graduation fee.
I. MEDICAL AND SURGICAL.					
1. "Regular."					
1	Medical College of Alabama	Mobile, Ala.	1856	\$25	\$30
2	Toland Medical College	San Francisco, Cal.	1864	5	40
3	Medical department of University of the Pacific	do	1859	5	40
4	Medical department of Yale College	New Haven, Conn.	1813	5	25
5	Medical College of Georgia	Augusta, Ga.	1832	5	30
6	Savannah Medical College	Savannah, Ga.	1856	5	30
7	Atlanta Medical College	Atlanta, Ga.	1855	5	25
8	Rush Medical College	Chicago, Ill.	1843	5	25
9	Chicago Medical College, (medical department of the Northwestern University.)	do	1859	5	20
10	Woman's Hospital Medical College*	do	1870	5	20
11	Indiana Medical College, (medical department of the State University.)	Indianapolis, Ind.	1869	10	25
12	College of Physicians and Surgeons	Keokuk, Iowa	1849	5	30
13	Medical department of Iowa State University	Iowa City, Iowa	1870	5	25
14	Medical department of the University of Louisville	Louisville, Ky.	1837	5	30
15	Louisville Medical College	do			
16	Medical department of the University of Louisiana	New Orleans, La.	1836	5	30
17	Medical School of Maine, (medical department of Bowdoin College.)	Brunswick, Me.	1820	5	20
18	Medical department of Washington University	Baltimore, Md.	1867	5	20
19	School of medicine of the University of Maryland	do	1807	5	20
20	Medical school of Harvard University	Boston, Mass.	1783	5	30
21	New England Female Medical College*	do	1848	5	30
22	Medical department of Michigan University†	Ann Arbor, Mich.	1870		
23	Detroit Medical College	Detroit, Mich.	1868	5	25
24	Missouri Medical College	St. Louis, Mo.	1840	5	20
25	St. Louis Medical College	do	1842	5	20
26	Medical College of Kansas City	Kansas City, Mo.	1870	5	25
27	Kansas City College of Physicians and Surgeons	do	1868	5	20
28	Medical department of Dartmouth College	Hanover, N. H.	1796	5	25
29	College of Physicians and Surgeons	New York City, N. Y.	1807	5	20
30	Albany Medical College	Albany, N. Y.	1838	5	25
31	Medical department of the University of New York	New York City, N. Y.	1841	5	30
32	Woman's Medical College of the New York Infirmary*	do	1865	5	30
33	Medical department of the University of Buffalo	Buffalo, N. Y.	1846	5	25
34	Long Island College Hospital	Brooklyn, N. Y.	1860	5	25
35	Bellevue Hospital Medical College	New York City, N. Y.	1861	5	30
36	Geneva Medical College, (medical department of Hobart College.)	Geneva, N. Y.	1834	5	20
37	Medical College of Ohio	Cincinnati, Ohio	1819	5	25
38	Cleveland Medical College, (medical department of University of Wooster.)	Cleveland, Ohio	1843	5	25
39	Starling Medical College	Columbus, Ohio	1847	5	20
40	Cincinnati College of Medicine and Surgery	Cincinnati, Ohio	1851	5	25
41	Miami Medical College	do	1852	5	25
42	Medical department of Willamette University	Salem, Oreg.		5	30
43	Medical department of University of Pennsylvania	Philadelphia, Pa.	1765	5	30
44	Jefferson Medical College	do	1826	5	30
45	Woman's Medical College of Pennsylvania*	do	1850	5	30
46	Medical department of Lincoln University	Oxford, Pa.			
47	Medical College of the State of South Carolina	Charleston, S. C.	1824	5	30
48	Medical department of University of South Carolina	Columbia, S. C.			
49	Medical department of the University of Nashville	Nashville, Tenn.	1850	5	30
50	Memphis Medical College, (medical department of Cumberland University.)‡	Memphis, Tenn.	1847	5	30
51	Galveston Medical College	Galveston, Tex.	1868		
52	Medical department of Vermont University	Burlington, Vt.		5	25
53	Medical department of the University of Virginia	Charlottesville, Va.	1825	25	15
54	Medical College of Virginia	Richmond, Va.	1838	5	30
55	Medical department of Georgetown College	Washington, D. C.	1850	5	30
56	National Medical College, (medical department of Columbian College.)	do	1821	5	30
57	Medical department of Howard University†	do	1867	5	

* For female students only.

† College not yet opened, (November 10, 1871,) on account of prevailing yellow fever and the suspension.

‡ After the war, reorganized in 1868; in 1871 became medical department of Cumberland University.

PHARMACEUTICAL INSTITUTIONS IN THE UNITED STATES.

President or dean.	Number of instructors.	Number of students.	Number of alumni.	Cost of lecture tickets.	Number of volumes in library.	Commencement of lecture course.	Number.
William H. Anderson, M. D.	11	.....	.....	Free .....	.....	.....	1
R. Beverly Cole, M. D., dean	11	.....	.....	120 00 .....	.....	July	2
Henry Gibbons, jr., M. D., dean	7	22	44	130 00 .....	.....	1st Monday in June	3
Chas. A. Lindsley, M. D., dean	8	35	.....	100 00	2,000	2d Thursday in September	4
L. A. Dugas, M. D., LL. D., dean	2	103	1,100	105 00	5,000	1st Monday in November	5
W. Duncan, M. D., dean	12	.....	.....	105 00	4,000	1st Wednesday in Nov'ber	6
J. G. Westmoreland, M. D., dean	2	.....	.....	120 00 .....	.....	1st Monday in May	7
Joseph W. Freer, M. D., president	16	213	1,433	55 00 .....	.....	.....	8
N. S. Davis, A. M., M. D., dean	17	107	330	50 00	1,000	1st Monday in October	9
W. H. Payford, A. M., M. D., pres	13	12	4	50 00 .....	.....	.....	10
J. A. Cummingor, M. D., secretary	9	100	60	Free .....	.....	October 17	11
J. C. Hughes, M. D., dean	8	.....	577	40 00 .....	.....	November 1	12
W. F. Peck, M. D., dean	11	57	.....	20 00 .....	.....	October 11	13
J. M. Bodine, M. D., dean	13	242	2,042	50 00	4,000	October 3	14
E. S. Gaillard, M. D., dean .....	.....	.....	.....	.....	.....	October 3	15
T. G. Richardson, M. D., dean	7	250	1,438	140 00	2,000	November 13	16
C. F. Bruckett, M. D., secretary	10	67	.....	70 00	4,000	February 15	17
Chas. W. Chancellor, M. D., dean	9	170	.....	120 00 .....	.....	October 1	18
Julian J. Chisolm, M. D., dean	10	172	.....	126 00 .....	.....	October 2	19
Calvin Ellis, M. D., dean	25	301	.....	120 00	2,000	September 28	20
Stephen Tracy, M. D., dean	5	26	83	75 00 .....	.....	1st Wednesday in Nov'ber	21
Abraham Sager, M. A., M. D., dean	9	315	.....	.....	.....	October 2	22
Theodore A. McGraw, M. D., secr'y	12	61	67	50 00 .....	.....	March 1	23
John S. Moore, M. D., dean	10	40	720	15 00 .....	.....	1st Monday in October	24
J. T. Hodgson, M. D., dean	9	162	1,630	15 00 .....	.....	2d Monday in October	25
Joseph Chew, M. D., president	10	18	.....	50 00 .....	.....	2d day of October	26
S. S. Todd, M. D., president	13	22	.....	105 00 .....	.....	2d day of October	27
A. D. Smith, D. D., LL. D.	11	44	.....	77 00	1,100	1st Thursday in August	28
Jas. W. Mc Lane, M. D., secretary	23	326	.....	150 00	1,200	October 1	29
J. V. Lanson, M. D. ....	.....	.....	.....	.....	4,500	1st Tuesday in September	30
J. W. Draper, M. D., LL. D., pres't	8	251	.....	130 00 .....	.....	October 12	31
Emily Blackwell, M. D., secretary	17	36	.....	105 00 .....	.....	1st Tuesday in October	32
Julius F. Miner, M. D., dean	11	101	.....	75 00	500	1st Wednesday in Nov'ber	33
S. G. Amor, M. D., dean	8	.....	.....	100 00 .....	.....	5th day of March	34
Austin Flint, jr., M. D., secretary	15	420	1,040	110 00 .....	.....	September 13	35
John Towler, M. D., dean	6	20	536	72 00	800	1st Wednesday in October	36
James Graham, M. D., dean	10	.....	1,631	40 00	1,500	1st week in October	37
J. Lang Cascells, M. D., LL. D., dean	14	101	.....	40 00 .....	.....	1st Wednesday in October	38
Francis Carter, M. D., dean	10	42	.....	60 00 .....	.....	October 5	39
E. S. Lawson, M. D., dean	8	100	.....	25 00 .....	.....	October 5	40
George Mendenhall, M. D., dean	9	180	.....	40 00 .....	.....	1st Tuesday in October	41
Daniel Paxton, M. D.	5	14	.....	110 00 .....	.....	1st Friday in November	42
E. F. Rogers, M. D., dean	11	310	.....	140 00 .....	.....	September 4	43
B. Howard Rand, M. D., dean	10	411	.....	140 00 .....	.....	2d Monday in September	44
Ann Preston, M. D., dean	2	60	138	105 00	1,300	1st Thursday in October	45
I. N. Randall, D. D., president	4	3	.....	.....	.....	.....	46
George E. Trescot, M. D., dean	9	.....	.....	120 00 .....	.....	1st Monday in November	47
T. B. Buchanan, M. D., secretary	10	203	1,333	50 00 .....	.....	October 3	48
A. Erskine, M. D., dean	8	23	.....	60 00 .....	.....	October 16	49
G. Dowell, M. D., dean .....	.....	.....	.....	.....	.....	.....	50
Peter Collier, Ph. D., M. D.	9	61	.....	70 00 .....	.....	1st Thursday in March	51
S. Maupin, A. M., M. D.	4	49	.....	100 00	35,000	October 1	52
James B. McCaw, M. D., dean	8	23	880	120 00	1,200	October 2	53
Johnson Eliot, M. D., dean	10	81	.....	135 00 .....	.....	October 2	54
John C. Riley, M. D., dean	12	54	.....	135 00 .....	.....	1st Monday in October	55
G. S. Palmer, M. D., dean	10	.....	.....	100 00 .....	.....	October 11	56

†Both sexes admitted.

sion of the *habes corpus* in a portion of the State. [Note by Dr. Trescot.]

Lebanon, Tenn., still at Memphis. [Note by Dr. Erskine.]

STATISTICS OF MEDICAL, DENTAL, AND PHARMA

Number.	Name.	Location.	Date of organization.	Matriculation fee.	Graduation fee.
2. "Eclectic."					
1	Bennett College of Eclectic Medicine and Surgery	Chicago, Ill.	1868	\$5	\$25
2	Eclectic Medical Institute	Cincinnati, Ohio	1844	5	25
3	Eclectic Medical College	New York City, N. Y.	1866	5	30
4	Eclectic Medical College	Philadelphia, Pa.	1848		
3. "Botanic."					
1	Physio-Medical Institute	Cincinnati, Ohio	1859	5	25
2	Physio-Medical College*	do	1851		
4. "Homoeopathic."					
1	Hahnemann Medical College	Chicago, Ill.	1859	5	30
2	Homoeopathic Medical College	St. Louis, Mo.	1858	5	30
3	Homoeopathic Medical College	New York City, N. Y.	1859	5	30
4	New York Medical College for Women	do	1863	5	10
5	Homoeopathic Hospital College†	Cleveland, Ohio	1849	5	30
6	Hahnemann Medical College	Philadelphia, Pa.	1847	5	30
II.—DENTAL.					
1	Baltimore College of Dental Surgery	Baltimore, Md.	1839	5	20
2	Dental school of Harvard University	Boston, Mass.	1868	5	30
3	Boston Dental College	do			
4	Missouri Dental College	St. Louis, Mo.	1866	5	30
5	New York College of Dentistry	New York City, N. Y.	1865		
6	Ohio College of Dental Surgery	Cincinnati, Ohio	1845	5	30
7	Pennsylvania College of Dental Surgery	Philadelphia, Pa.	1856	5	30
8	Philadelphia Dental College	do	1863	5	30
9	New Orleans Dental College	New Orleans, La.	1867	5	30
III.—PHARMACEUTICAL.					
1	Chicago College of Pharmacy	Chicago, Ill.	1859	2	5
2	Department of Pharmacy, Iowa Wesleyan University	Mount Pleasant, Iowa	1871	5	5
3	Kansas College of Pharmacy	Leavenworth, Kans.	1869	2	5
4	Louisville College of Pharmacy	Louisville, Ky.			
5	Maryland College of Pharmacy	Baltimore, Md.	1841	4	10
6	School of Pharmacy, University of Michigan	Ann Arbor, Mich.	1868	5	20-35
7	Massachusetts College of Pharmacy	Boston, Mass.	1867		
8	Mississippi College of Pharmacy	Jackson, Miss.			
9	St. Louis College of Pharmacy	St. Louis, Mo.		5	5
10	College of Pharmacy of the City of New York	New York City, N. Y.	1829	2	5
11	College of Pharmacy of Baldwin University	Berea, Ohio	1865	2	5
12	Cincinnati College of Pharmacy	Cincinnati, Ohio			
13	Philadelphia College of Pharmacy	Philadelphia, Pa.	1821	4	10
14	School of Pharmacy of Columbian College	Washington, D. C.			
15	School of Pharmacy of Georgetown College	do	1870	5	20
16	New Orleans College of Pharmacy	New Orleans, La.	1865	5	15

*At present in abeyance; formerly (1851-58) devoted to the medical education of both sexes; this opened the college during the present session, 1871-'72. [Note by Dr Curtis.]

†Both sexes admitted.

CEUTICAL INSTITUTIONS IN THE UNITED STATES—Continued.

President or dean.	Number of professors.	Number of students.	Number of alumni.	Cost of lecture tickets.	Number of volumes in library.	Commencement of lecture course.	Number.
Milton Jay, M. D., dean	14	103		\$50 00		October 3.	1
John M. Scudder, M. D., dean ..	7	213		50 00		October 16	2
Robert S. Newton, M. D., pres't.	7	76	133	105 00	500	October 12	3
							4
Wm. H. Cook, A. M., M. D., dean ..	6			75 00		October 10	1
A. Curtis, A. M., M. D., dean							2
F. A. Lord, M. D., registrar	15	113		85 00		2d Thursday in October	1
J. T. Temple, M. D., dean							2
Carroll Dunham, M. D., dean	16	94	341	100 00		2d Tuesday in October	3
		47		105 00			4
H. F. Biggar, M. D., registrar	17	89	780	90 00	2,000	Last Wednesday in Sept	5
H. N. Guernsey, M. D., dean	11	134		100 00		2d Monday in October	6
F. J. S. Gorges, M. D., dean	10		664	100 00		October 15	1
N. C. Kepp, M. D., dean	8	27		110 00		First Wednesday in Nov'ber ..	2
							3
Homer Judd, M. D., D. D. S., dean ..	9	20	37	100 00		October 16	4
Frank Abbott, M. D., dean	8	29	47	170 00		October 15	5
J. Tutt, D. D. S., dean	7	20	210	160 00	100	October 16	6
E. Wilmar, M. D., D. D. S., dean ..	7	74		100 00		November 1	7
J. H. McQuillen, M. D., D. D. S., dean.	7	73	120	100 00		November 1	8
Jas. S. Knapp, D. D. S., dean	8	25	23	100 00		November 27	9
A. E. Ebert, dean	3	43	3	30 00	600	First Monday in October	1
John Wheeler, D. D., president ..	3			35 00		December 13	2
B. W. Woodward, president							3
F. C. Miller, secretary							4
J. Brown Eakley, president	3	45	110	36 00		October 10	5
A. B. Prescott, M. D.	3	39				October 1	6
George T. H. Markoe, dean	3			30 00		October 2	7
Matt. T. Ash, president							8
W. H. Cravard, president	3			10 00		October 2	9
H. A. Cassebeer, jr. secretary ..	3	90	157	30 00	550	September 25	10
W. D. Godman, D. D., president ..	3		22	45 00		November 15	11
E. S. Wayne, dean	3			30 00			12
Robert Bridges, M. D., dean	3	242	821	36 00	2,500	October 1	13
John C. Riley, M. D.	3	12		40 00		1st Monday in October	14
Johnson Elliot, M. D., dean	3	20				October 2	15
S. Logan, M. D., dean						October 15	16

gave rise to the preceding No. 1 "Botanic;" charter has not been surrendered, and it is proposed to
 †For female students only.

STATISTICS OF AGRICULTURAL AND SCIENTIFIC SCHOOLS IN THE UNITED STATES.

Number.	Name.	Location.	THE NATIONAL GRANT.				President.	Number of in- structors.	Number of stu- dents.	Number of ol- dinary.
			Acres in scrip.	Date of ac- ceptance.	Date of estab- lishment.					
	COLLEGES OF AGRICULTURE AND THE MECHANIC ARTS RECEIVING THE NATIONAL GRANT OF LANDS.									
1	College of Agriculture, the Mechanic Arts, Mines and Civil Engineering of Yale College.....	Oakland, California.....	150,000	Mar. 31, 1866	Mar. 31, 1866		H. Durant, A. M.....			
2	Sheffield Scientific School of Yale College.....	New Haven, Connecticut...	180,000	June 24, 1863	—	1847	Noah Porter, D. D., LL. D.....	22	146	0,500
3	Delaware College, Departments of Science and Agriculture.....	Newark, Delaware.....	90,000	Feb. 17, 1867	Mar. 14, 1867		Wm. H. Furnell, A. M.....	3		
4	University of Georgia, Departments of Agricul- ture and Engineering.....	Athens, Georgia.....	270,000	Mar. 10, 1866			A. A. Lipscomb, D. D.....	6	26	
5	Illinois Industrial University.....	Urbana, Illinois.....	480,000	Jan. 25, 1867	Feb. 28, 1867		John N. Gregory, LL. D.....	14	277	5,000
6	Purdue College.....	Lafayette, Indiana.....	390,000	Mar. 6, 1865			A. S. Welch, A. M.....	10	218	
7	Iowa State Agricultural College.....	Ames, Iowa.....	240,000	Sept. 11, 1863	Mar. 29, 1866		J. Denison, D. D.....	10	194	3,000
8	Kansas State Agricultural College.....	Manhattan, Kansas.....	60,000	Feb. 8, 1863	Feb. 16, 1863		Jas. K. Patterson.....	9	212	
9	Agricultural and Mechanical Departments, Ken- tucky University.....	Lexington, Kentucky.....	330,000	Jan. 27, 1863	Feb. 23, 1865		David F. Boyd.....	2		
10	Scientific Course of the Louisiana State Uni- versity.....	Baton Rouge, Louisiana.....	210,000				M. C. Fernald, A. M.....	10	29	1,000
11	Maine State College of Agriculture and the Me- chanic Arts.....	Orono, Maine.....	210,000	Mar. 25, 1863	Feb. 23, 1865		S. Regester, D. D.....	8	136	
12	Maryland Agricultural College.....	Hyattsville, Maryland.....	210,000	Jan. 24, 1864	April 29, 1863		W. S. Clark, Ph. D.....	24	147	
13	Massachusetts Agricultural College.....	Amherst, Massachusetts.....	360,000	Feb. 25, 1863	Mar. 18, 1863		F. E. Abbott, M. A.....	7	142	
14	Michigan Agricultural College.....	Lansing, Michigan.....	240,000	Mar. 2, 1865			Wm. W. Fawcett, M. A.....	3		
15	College of Agriculture and Mechanic Arts, of the University of Minnesota.....	St. Anthony, Minnesota.....	130,000				John N. Waddell, D. D.....	6	12	
16	Scientific Department of the University of Mis- sissippi.....	Oxford, Mississippi.....	210,000				G. C. Swallow.....	1	6	
17	Agricultural Department of Missouri University.....	Columbia, Missouri.....	330,000	July 9, 1863	July 9, 1863	1870	A. D. Smith, D. D., LL. D.....	9	86	1,000
18	New Hampshire College of Agriculture and Me- chanic Arts.....	Hanover, New Hampshire.....	150,000				W. H. Campbell, D. D., LL. D.....	10	61	
19	Batzer's Scientific School.....	New Brunswick, New Jersey.....	210,000	Mar. 21, 1863	April 4, 1864		A. D. White, LL. D.....	8	225	
20	Cornell University.....	Ithaca, New York.....	990,000	May 14, 1863	April 27, 1865		S. Pool.....	1		
21	College of Agriculture and the Mechanic Arts, University of North Carolina.....	Chapel Hill, North Carolina.....	270,000							
22	Agricultural College of Oregon.....	Corvallis, Oregon.....	90,000							
23	Agricultural College of Pennsylvania.....	Philadelphia, Pennsylvania.....	780,000	May 1, 1863			A. Caswell, D. D., LL. D.....	3		
24	Scientific School of Brown University.....	Providence, Rhode Island.....	130,000	Jan. 23, 1863						

25	Department of Agriculture and Mechanic Arts, East Tennessee University.	Knoxville, Tennessee.....	300,000	—	—	1863	T. W. Humes, D. D.	3	40
26	Vermont State Agricultural Chemistry.....	Barre, Vermont.....	150,000	Nov. 25, 1864	Nov. 11, 1862	Nov. 25, 1864	C. S. Venable, LL. D.	2	14
27	Department of Agriculture, Chemistry, Engi- neering, Virginia University.	University of Virginia, Va.	300,000	—	—	—	—	6	74
28	Agricultural College of West Virginia.....	Morgantown, W. Virginia..	150,000	Oct. 3, 1863	Oct. 3, 1863	Feb. 7, 1867	J. H. Twombly.....	3	52
29	Technical Courses, University of Wisconsin..	Madison, Wisconsin.....	240,000	Apr. 2, 1862	Apr. 2, 1862	April 12, 1866	—	—	—
OTHER SCIENTIFIC SCHOOLS NOT ENDOWED BY CONGRESS.									
30	School of Natural Sciences, East Alabama College.	Auburn, Alabama.....		—	—	1860	A. D. McVay, A. M.	3	59
31	Scientific Course of Bowdon College.....	Bowdon, Georgia.....		—	—	—	F. H. M. Henderson, A. B.	3	—
32	Science Department, Northwestern University.	Evanston, Illinois.....		—	—	—	L. O. Haven, D. D., LL. D.	3	50
33	Massachusetts Institute of Technology.....	Boston, Massachusetts.....		April 10, 1861	April 10, 1861	—	J. D. Rankin, A. M., Ph. D.	13	224
34	Worcester Free Institute.....	Worcester, Massachusetts..		May 1, 1865	May 1, 1865	—	C. O. Thompson, A. M.	6	82
35	Horticultural School for Women.....	Newton Centre, Mass.....		—	—	1870	Miss Abby W. May.....	—	—
36	Scientific Department of Tufts College.....	Medford, Massachusetts..		—	—	1855	A. A. Miner, D. D.	—	—
37	Scientific School of Harvard University.....	Cambridge, Massachusetts..		—	—	—	Charles W. Eliot, LL. D.	11	35
38	Scientific Department of Michigan University.	Ann Arbor, Michigan.....		—	—	1853	J. E. Angell, LL. D.	6	126
39	Scientific Course of Washington College.....	St. Louis, Missouri.....		—	—	—	W. G. Eliot, D. D.	5	189
40	Scientific Department of Dartmouth College.	Fulton, Missouri.....		—	—	—	X. L. Rice, D. D.	13	77
41	Chandler Engineering School of Dartmouth College.	Hanover, New Hampshire..		—	—	—	Asst. D. Smith, D. D., LL. D.	7	5
42	Stevens' Institute of Technology.....	Hoboken, New Jersey.....		April 15, 1867	April 15, 1867	—	Henry Morton, Ph. D.	7	—
43	Brooklyn Collegiate and Polytechnic Institute.	Brooklyn, New York.....		—	—	1865	D. H. Cochran, Ph. D., LL. D.	3	48
44	School of Mines, Columbia College.....	New York, New York.....		—	—	—	E. A. P. Barnard, S. T. D., LL. D.	22	92
45	Scientific Department of Trinity College.....	Scariff h Point, N. Carolina		—	—	—	B. Claven, D. D.	1	—
46	Scientific Department of the University of the City of New York.	New York, New York.....		—	—	—	John W. Draper, M. D., LL. D.	6	56
47	Scientific Department of Lafayette College.....	Easton, Pennsylvania.....		—	—	1866	Wm. C. Cattell, D. D.	4	—
48	Scientific School of Lehigh University.....	South Bethlehem, Penn.....		—	—	—	Henry Cooper, LL. D.	7	116
49	Scientific Course of the University of Pennsyl- vania.	Philadelphia, Pennsylvania..		—	—	—	Chas. J. Stueb, LL. D.	5	35
50	Scientific Department of the Western Univer- sity of Pennsylvania.	Pittsburgh, Pennsylvania..		—	—	—	G. Woods, LL. D.	3	36
51	Scientific Department, University of Nashville.	Nashville, Tennessee.....		—	—	—	E. Kirby Smith.....	2	—
52	Scientific Department, Norwich University.....	Norfield, Vermont.....		—	—	—	R. S. Howard, D. D.	1	—
53	Agricultural Department of Hampton Institute.	Hampton, Virginia.....		—	—	—	S. C. Armstrong.....	2	—
54	Scientific Department of Washington and Lee University.	Lexington, Virginia.....		—	—	—	G. W. Custis Lee.....	4	148
55	Scientific Department of Bethany College.....	Brooke County, W. Virginia		—	—	—	W. K. Pendleton.....	3	30

SUPPLEMENT.—STATISTICS OF INSTITUTIONS FOR THE SUPERIOR INSTRUCTION OF FEMALES EXCLUSIVELY, NOT COMPRIENDED IN THE TABLE OF ACADEMIES, &c., IN THIS REPORT.

Number.	Name.	Location.	Date of organization.	President.	Denomination.	Number of instructors.	Number of students.	Cost of tuition per term.	Cost of board per month.	Number of volumes in library.
1	Florence Synodical Female College	Florence, Ala.	1846	Rev. W. H. Mitchell, D. D.	Pres.	7	91	\$800	\$200	.....
2	Huntsville Female College	Huntsville, Ala.	1846	Rev. J. G. Wilson, D. D.	M. E.	11	114	\$450	.....	.....
3	Marion Female Seminary	Marion, Ala.	1836	J. K. Thompson	Bapt.	9	135	\$180	\$200	1,000
4	Jackson Female Seminary	Jackson, Ala.	1838	Rev. A. J. Battle	Bapt.	13	165	\$5	\$200	.....
5	Tuskegee Female College	Tuskegee, Ala.	1858	Rev. B. F. Landrum, A. M.	Bapt.	9	50	\$600	.....	.....
6	East Alabama Female College	Do.	1855	Rev. H. Ragsdale, M. A.	M. E. S.	10	72	\$70	\$250	500
7	Tuskegee Female College	Do.	1855	Rev. G. W. F. Price, M. A.	Cong.	10	137	\$70	.....	.....
8	Young Ladies' Seminary	Pemola, Cal.	1832	C. H. Pope	M. E. S.	8	43	\$850	.....	.....
9	Female College of the Pacific	Oakland, Cal.	1834	Rev. B. W. Swarth, D. D.	Cong.	14	125	\$200	.....	.....
10	College of Notre Dame	San Diego, Cal.	1855	Marie Guillelme	R. C.	24	550	\$450	.....	.....
11	Grove Hall Young Ladies' School	New London, Conn.	1839	Prof. O. P. Hubbard	Cong.	10	71	\$475	.....	.....
12	Stamford College for the Institute for Ladies	New London, Conn.	1855	Miss Marion A. Greene	Cong.	6	71	Free	.....	.....
13	Young Ladies' Institute	Stamford, Conn.	1855	R. C. Planch, A. M.	P. E.	5	40	\$75	.....	.....
14	Young Ladies' College	Windsor, Conn.	1857	Miss John S. Williams	P. E.	9	120	\$200-50	\$300	3,500
15	Wesleyan Female College	Winsten, Conn.	1857	Rev. John Wilson, A. M.	M. E.	5	120	\$65-75	\$180	.....
16	North Georgia Female College	Atlanta, Ga.	1851	A. J. Hall, A. M.	M. E.	7	.....	\$25-55	.....	.....
17	Southern Masonic Female College	Covington, Ga.	1851	Rev. J. N. Emdinlaw	Mas.	7	.....	\$20-50	.....	.....
18	Griffin Female College	Griffin, Ga.	1849	R. A. Noble, A. M.	Mas.	8	127	\$20-50	\$20	.....
19	Hamilton Female College	Hamilton, Ga.	1849	J. H. Loveless	M. E.	11	124	\$20-50	15	.....
20	Southern Female College	La Grange, Ga.	1842	J. F. Cox, A. M.	Mas.	11	124	\$40-40	\$175	.....
21	Lumpkin Masonic Female College	Lumpkin, Ga.	1851	Rev. D. S. T. Donahoe, A. M.	Mas.	5	86	\$25-45	15-15	.....
22	Wesleyan Female College	Marion, Ga.	1841	Rev. J. M. Payne, D. D.	P. E.	11	246	\$70	\$255	.....
23	Montpelier Institute for Young Ladies	New March, Ga.	1841	Rev. J. T. Payne, M. A.	P. E.	5	100	\$200	.....	1,000
24	Georgia Female College	Macon, Ga.	1849	Rev. G. V. Browne	P. E.	5	100	\$20-40	\$100	.....
25	Marion Female College	Milledgeville, Ga.	1858	Rev. W. A. Rogers, A. M.	M. E.	5	60	\$60	\$150	500
26	Le Verre College	Talbotton, Ga.	1856	Rev. H. D. Moore	M. E.	5	60	\$25-40	15	.....
27	West Point Female College	West Point, Ga.	1856	A. P. Moody, A. M.	M. E.	6	129	\$25-40	15	.....
28	Cuthbert Female College	Cuthbert, Ga.	1851	Dr. A. J. Hamilton	Bapt.	5	60	\$20-40	15	.....
29	La Grange Female College	La Grange, Ga.	1851	Rev. M. Callaway	Bapt.	5	60	\$20-40	15	.....
30	Forsyth Female College	Forsyth, Ga.	.....	.....	.....	.....	.....	.....	.....	.....
31	Perry Female College	Perry, Ga.	.....	.....	.....	.....	.....	.....	.....	.....
32	Masonic Female College	Atlanta, Ga.	.....	.....	.....	.....	.....	.....	.....	.....
33	Major Female College	Bloomington, Ill.	1855	Rev. W. P. Jones, A. M.	M. E.	5	61	\$74	18	500
34	Northwestern Female College	Evansville, Ill.	1856	Rev. J. B. White, A. M.	M. E.	13	119	.....	.....	.....
35	Alma College	Greenville, Ill.	.....	.....	.....	8	115	\$174	.....	.....

36	Illinois Female College	Jacksonville, Ill.	1 69	W. H. De Motte, A. M.	11	129	6230
37	Young Ladies' Seminary	Lebanon, Ky.	1 70	E. P. Weston, A. M.	13	121	a-0
38	Mount Carroll Seminary	Mount Carroll, Ill.	1 72	Mrs. F. A. W. Sloner	13	180	24-0
39	Quincy Female Seminary	Quincy, Ill.	1 66	Miss M. L. Chapman	7	150	a 1
40	Rockford Female Seminary	Rockford, Ill.	1 66	Rev. F. E. Holland	15	221	a 2
41	Methodian Seminary for Young Ladies	Hope, Ind.	1 72	Rev. F. E. Holland	10	60	61-1
42	De Puy College	New Albany, Ind.	1 72	Rev. F. E. Holland	6	115	6 200
43	Episcopal Female Seminary	Touhy, Ky.	1 71	Rev. J. N. Lee, A. M.	8	115	6 200
44	The Daughters of Peace	Greenville Springs, Ky.	1 71	Rev. J. N. Lee, A. M.	8	115	6 200
45	Lebanon Baptist Female College	Lebanon, Ky.	1 69	Rev. V. E. Rutledge	8	115	6 200
46	St. Catharine's Academy	do	1 69	Rev. V. E. Rutledge	8	115	6 200
47	Rockford Female College	Baltimore, Md.	1 69	R. Graham, A. M.	8	115	6 200
48	Baltimore Female Seminary	Baltimore, Md.	1 69	R. Graham, A. M.	8	115	6 200
49	Bucksville Female Seminary	Bucksville, Md.	1 69	R. Graham, A. M.	8	115	6 200
50	Fredrick Female Seminary	Fredrick, Md.	1 69	R. Graham, A. M.	8	115	6 200
51	Fulton Female Seminary	Sandy Spring, P. O., Md.	1 69	R. Graham, A. M.	8	115	6 200
52	Albion Female Seminary	Albion, Mass.	1 67	Rev. J. P. Hartung, A. M.	10	147	a 1-0
53	Bradford Academy	Bradford, Mass.	1 67	Rev. J. P. Hartung, A. M.	10	147	a 1-0
54	Young Ladies' Institute	Pittsford, Mass.	1 67	Rev. J. P. Hartung, A. M.	10	147	a 1-0
55	Mount Holyoke Female Seminary	South Hadley, Mass.	1 67	Rev. J. P. Hartung, A. M.	10	147	a 1-0
56	Michigan Female College	Lansing, Mich.	1 50	Miss H. M. French	24	276	6150
57	Young Ladies' Seminary and Collegiate Institute	Monroe, Mich.	1 50	Miss H. M. French	24	276	6150
58	St. Mary's Hall	Fat Center, Minn.	1 50	Miss S. T. Danington	8	107	a 21-2
59	Central Female Institute	Clinton, Miss.	1 53	Rev. W. H. Harlan, A. M.	8	123	6 50
60	Columbus Female Institute	Columbus, Miss.	1 53	Rev. W. H. Harlan, A. M.	8	123	6 50
61	Chickasaw Female College	Pontotoc, Miss.	1 52	Rev. J. P. Hartung, A. M.	10	147	a 1-0
62	Meridian Female College	Meridian, Miss.	1 52	Rev. J. P. Hartung, A. M.	10	147	a 1-0
63	Sharon Female College	Sharon, Miss.	1 52	Rev. J. P. Hartung, A. M.	10	147	a 1-0
64	Liberty Female College	Liberty, Mo.	1 52	Rev. W. L. C. Hummel	6	144	a 30-50
65	Lindenwood Female College	St. Charles, Mo.	1 52	A. Matchel	4	70	a 30-62
66	Academy of the Visitation	St. Louis, Mo.	1 56	Rev. J. H. Nixon	11	170	a 20-0
67	Stephens College	do	1 56	Rev. J. H. Nixon	20	280	a 300
68	Adams Female Seminary	East Derry, N. H.	1 51	Miss E. L. Lebar	4	101	a 53
69	Tilden Ladies' Seminary	West Lebanon, N. H.	1 51	Rev. J. H. Lebar	12	100	6 250-300
70	Bardonia Female Seminary	Bardonia, N. J.	1 53	Rev. J. H. Lebar	12	100	6 250-300
71	Chenoweth Collegiate Institute	Matamoras, N. J.	1 55	A. B. Dayton, M. D.	Pres.		6 475
72	Facet's Collegiate Institute	Brooklyn, N. Y.	1 55	A. B. Dayton, M. D.	24	782	6 475
73	Ontario Female Seminary	Ontario, N. Y.	1 55	Rev. J. H. Lebar	9	135	6 28-0
74	Chenoweth College	Chenoweth, N. Y.	1 55	Rev. J. H. Lebar	22	109	6 300
75	Elmira Female College	Elmira, N. Y.	1 55	Rev. J. H. Lebar	15	179	6 230
76	Ingham University	Le Roy, N. Y.	1 55	Rev. J. H. Lebar	15	179	6 230
77	St. Joseph's Academy	Lockport, N. Y.	1 55	Rev. J. H. Lebar	15	179	6 230
78	Jane Croft School for Young Ladies	Mont Morris, N. Y.	1 55	Rev. J. H. Lebar	15	179	6 230
79	Rutgers Female College	New York City, N. Y.	1 55	Rev. J. H. Lebar	15	179	6 230
80	Rockland Female College	New York City, N. Y.	1 55	Rev. J. H. Lebar	15	179	6 230
81	Vassar College	Poughkeepsie, N. Y.	1 55	Rev. J. H. Lebar	15	179	6 230
82	Wells College	Andover, N. Y.	1 55	Rev. J. H. Lebar	15	179	6 230
83	Davenport Female College	Lebanon, N. C.	1 56	Rev. J. H. Lebar	15	179	6 230
84	Murfreesborough Female College	Murfreesborough, N. C.	1 56	Rev. J. H. Lebar	15	179	6 230
85	Chowan Baptist Female Institute	do	1 56	Rev. J. H. Lebar	15	179	6 230
86	St. John's Female College	Oxford, N. C.	1 56	Rev. J. H. Lebar	15	179	6 230

SUPPLEMENT.—STATISTICS OF INSTITUTIONS FOR THE SUPERIOR INSTRUCTION OF FEMALES, &c.—Continued.

Number.	Name.	Location.	Date of organization.	President.	Denomination.	Number of instructors.	Number of students.	Cost of tuition per term.	Cost of board per month.	Number of volumes in library.
87	Raleigh Female Seminary.	Raleigh, N. C.	1866	E. P. Hollogood, A. M.	P. E.	7	160	\$20-40	\$160	---
88	St. Mary's Female Academy.	do	1866	A. Suredes, S. D.	P. E.	31	217	\$40	\$200	3,500
89	Salem Female Academy.	Salem, N. C.	1854	Rev. M. E. Grunert.	Mor.	---	---	---	---	---
90	Concord Female College.	Watsville, N. C.	1867	Rev. E. F. Lockwell, A. M.	---	---	---	---	---	---
91	Wilson College-Female Seminary.	Watsville, N. C.	1867	Rev. W. Hooper, LL. D.	---	7	79	\$40-60	\$170	---
92	Young Ladies' Literary Institute.	Cincinnati, Ohio	---	---	---	---	---	---	---	---
93	Cincinnati Young Ladies' Seminary.	Cincinnati, Ohio	1851	G. M. Maxwell, D. D.	Pres.	10	175	\$600	\$230	5,000
94	Cincinnati Wesleyan College.	do	1842	Rev. L. H. Baghee, D. D.	M. E.	17	209	\$80	---	1,256
95	Mount Auburn Young Ladies' Institute.	do	1856	Mrs. C. H. Smith.	---	11	149	\$400	---	1,000
96	Cleveland Female Seminary.	Cleveland, Ohio	1836	S. N. Sanford, A. M.	P. E.	13	109	\$88	\$300	1,000
97	Ohio Female College.	Cleveland, Ohio	1848	A. E. Sloan, A. M.	---	13	150	\$250-350	---	1,000
98	Cuoper Seminary.	College Hill, Ohio	---	---	---	9	---	\$650	---	---
99	Ohio Wesleyan Female College.	Dayton, Ohio	1863	Mrs. B. G. Galloway.	M. E.	10	210	---	13	---
100	Glendale Female College.	Toledo, Ohio	1854	Rev. P. S. Donaldson, D. D.	Pres.	12	122	\$250	\$170	2,500
101	Granville Female College.	Granville, Ohio	1831	Rev. L. D. Potter, A. M.	Pres.	8	150	\$30	---	---
102	Oakland Female Seminary.	Granville, Ohio	1831	Rev. W. P. Kerr, A. M.	M. E.	4	---	---	---	---
103	Hillsborough Female College.	Hillsborough, Ohio.	1843	Rev. J. McP. Matthews, D. D.	M. E.	6	75	\$36-48	\$160	300
104	Oxford Female College.	Oxford, Ohio	1855	Rev. D. Copeland, A. M.	M. L.	11	117	\$250	---	---
105	St. Helen's Hall.	Portland, Oreg.	1854	Rev. E. D. Morris, D. D.	Pres.	---	179	\$20-50	\$54	---
106	Allentown Female College.	Allentown, Pa.	1867	Rev. W. R. Hooford, A. M.	G. R.	7	94	\$50	---	---
107	Moravian Seminary for Young Ladies.	Gettysburg, Pa.	1863	Rev. F. W. Wille.	Mor.	30	230	\$600	\$235	4,000
108	Wilson College.	Gettysburg, Pa.	---	---	---	9	81	\$300	---	---
109	University Female Institute.	Chambersburg, Pa.	1846	Miss H. E. Spratt.	Bapt.	8	100	---	\$145	1,000
110	Brooke Hall Female Seminary.	Lewisburg, Pa.	1856	Maria L. Eastman.	---	16	72	\$500	---	---
111	Oakland Female Institution.	Media, Pa.	1845	J. G. Ralston, D. D., LL. D.	Pres.	10	70	\$230	\$175	5,500
112	Chestnut Street Female Seminary.	Norristown, Pa.	1830	Miss M. L. Bouney.	Bapt.	18	75	\$125	---	1,600
113	Academy of Notre Dame.	Philadelphia, Pa.	1867	Sister Julia.	R. C.	13	180	\$42-45	\$260	500
114	Pittsburgh Female College.	Pittsburgh, Pa.	1855	Rev. I. C. Pershing, D. D.	M. E.	20	285	\$62-75	\$210	---
115	Susquehanna Female College.	Schuberg, Pa.	---	---	---	4	82	\$170	18	200
116	College Hill College for Young Ladies.	Collegeville, Pa.	1868	W. Neefling, A. M.	U. L.	9	102	---	---	---
117	Pennsylvania Female College.	Greenville, S. C.	1854	Rev. D. Eberly, A. M.	Bapt.	5	55	\$70-90	\$150	200
118	Greenville Baptist Female College.	Franklin, Tenn.	---	---	---	9	141	\$70-90	\$180	---
119	Tennessee Female College.	Franklin, Tenn.	---	Rev. R. R. Harpove, A. M.	---	5	150	\$12-24	---	---
120	McMinnville Female College.	McMinnville, Tenn.	1851	C. H. Jackson.	M. E.	4	55	---	---	---
121	Camden Female College.	Camden, Tenn.	---	Prof. A. W. Barney.	G. P.	4	75	\$200	---	400

Continued.—SUMMARY OF EXAMINATIONS FOR ADMISSION TO THE UNITED STATES MILITARY AND NAVAL ACADEMIES DURING THE YEAR 1871.

STATES AND TERRITORIES.	U. S. MILITARY ACADEMY.										U. S. NAVAL ACADEMY.									
	Candidates. No.	Accepted total. No.	Total. No.	REJECTED.							Candidates. No.	Accepted total. No.	Total. No.	REJECTED.						
				Physical disability. No.	On what account.									Physical disability. No.	On what account.					
					Reading. No.	Writing and orthography. No.	Arithmetic. No.	Geography. No.	Grammar. No.	History. No.					Reading. No.	Writing and orthography. No.	Arithmetic. No.	Geography. No.	Grammar. No.	History. No.
Alabama.....	4	1	3				1	3	2	3	1	1								
Arkansas.....	1		1				1		1	1	1	1								
California.....																				
Connecticut.....	2	1	1				1		1		1		1				1			
Delaware.....	1	1									1	1								
Florida.....																				
Georgia.....	4		4	1			2	2	2	3	3	3								
Illinois.....	3	2	1				1				5	3					2	2	1	1
Indiana.....	4	3	1				1	1	1	1	6	4	2				2	1	2	
Iowa.....	4	2	2	1					1											
Kansas.....	1	1																		
Kentucky.....	7	4	3		2	3	2	2	3	2	2	1	1			1				
Louisiana.....	2	2									1	1								
Maine.....	1	1									1	1								
Maryland.....											4	2	2			1	1	1		
Massachusetts.....	4	3	1	1							2	2								
Michigan.....											1	1	1			1	1	1		
Minnesota.....											1	1								
Mississippi.....	3	3									3	2	1			1	1	1		
Missouri.....	4	1	3			2			1	2	3	3								
Nebraska.....																				
Nevada.....	1	1																		
New Hampshire.....											1	1								
New Jersey.....	2	1	1						1	1	2	2								
New York.....	15	10	5	2		1		2	3	2	11	9	2			2	2	1	2	
North Carolina.....											2	1	1			1	1			
Ohio.....	9	8	1			1		1	1	1	5	3				1	2			
Oregon.....	1	1																		
Pennsylvania.....	13	7	5	2	1	1	1	1	3	2	5	1	4	1		3	3	3	2	
Rhode Island.....	2	1	1	1					1		1	1	1	1						
South Carolina.....											2	1	1			1				
Tennessee.....	4	3	1				1	1		1	5	3	2	1						
Texas.....	2	2																		
Vermont.....	1	1									2	1	1			1	1			
Virginia.....	5	1	4	1		1	2	1	2	2	1	1								
West Virginia.....	1	1																		
Wisconsin.....	2	1	1			1	1		1	1	2	2								
Arizona Ter.....											1	1								
Colorado Ter.....	1	1																		
Dakota Ter.....																				
District of Columbia.....																				
Idaho Ter.....																				
Montana Ter.....											1	1								
New Mexico Ter.....	1	1									1	1								
Utah Ter.....	1	1																		
Washington Ter.....											1	1								
Wyoming Ter.....																				
Foreign.....											*1	1				1	2	1	1	
At large.....	13	10	3	2			1				17	15	2							
Total.....	119	77	42	11	3	10	15	14	24	22	97	71	26	3		15	21	11	10	

* A Japanese student.

Number.	Name.	Location.	Date of organization.	Principal.
1	State Normal School.	Talladega, Ala.		
2	Arkadelphia Normal School.	Arkadelphia, Ark.	1869	Rev. John Jordan.
3	Girls' Normal School.	San Francisco, Cal.	1869	Ellis H. Holmes.
4	State Normal School.	San José, Cal.	1862	W. T. Lucky, A. M., D.D.
5	State Normal School.	New Britain, Conn.	1849	Isaac N. Carleton, A. M.
6	Normal University.	Wilmington, Del.	1867	John C. Harkness.
7	East Florida Seminary.	Gainesville, Fla.		
8	West Florida Seminary.	Fla.		
9	Normal dep't Atlanta University.	Atlanta, Ga.		E. A. Ware, A. M.
10	State Normal University.	Normal, Ill.	1857	
11	Cook County Normal School.	Englewood, Ill.	1868	D. S. Wentworth.
12	Normal class of Westfield College.	Westfield, Ill.		
13	Normal dep't of Eureka College.	Eureka, Ill.		H. W. Everest, A. M.
14	Addison Teachers' Seminary.	Addison, Ill.		
15	County Normal School.	Peoria, Ill.	1868	
16	Southern Illinois Normal University.	Carbondale, Ill.	1869	
17	County Normal Schools.	Bureau County, Ill.		A. Ethridge.
18	City Normal School.	Chicago, Ill.		
19	Northwestern German-English Normal School.	Galena, Ill.	1860	J. Wernli.
20	State Normal School.	Terre Haute, Ind.	1867	W. A. Jones, A. M.
21	City Training School.	Fort Wayne, Ind.	1867	Mary H. Swann.
22	City Training School.	Indianapolis, Ind.	1867	Amanda F. Funnell.
23	Normal dep't of Iowa College.	Grinnell, Iowa.		George F. Magoun, D. D.
24	Teachers' dep't of Tabor College.	Tabor, Iowa.		
25	Normal dep't of Iowa University.	Iowa City, Iowa.	1866	S. N. Fellows.
26	City Training School.	Davenport, Iowa.	1863	Mrs. M. A. McGonegal.
27	State Normal School.	Emporia, Kans.	1864	George W. Hoss, A. M.
28	Ely Normal School.	Louisville, Ky.		
29	Normal course of Georgetown Coll.	Georgetown, Ky.		N. M. Crawford, D. D.
30	Normal department Berea College.	Berea, Ky.		E. H. Fairchild, D. D.
31	New Orleans Normal School.	New Orleans, La.	1858	Mrs. K. Shaw.
32	Normal dep't Straight University.	New Orleans, La.	1869	J. W. Healey.
33	Eastern State Normal School.	Castine, Me.	1867	J. T. Fletcher, A. M.
34	Western State Normal School.	Farmington, Me.	1863	C. C. Rounds, M. S.
35	State Normal School.	Baltimore, Md.	1865	M. A. Newell.
36	County Normal School.	Alleghany County, Md.		
37	State Normal School.	Westfield, Mass.	1839	J. W. Dickinson, A. M.
38	State Normal School.	Frammingham, Mass.	1839	Annie E. Johnson.
39	State Normal School.	Salem, Mass.	1854	D. B. Hagar, A. M.
40	State Normal School.	Bridgewater, Mass.	1840	A. J. Boyden, A. M.
41	City Normal School.	Boston, Mass.		
42	City Normal School.	Worcester, Mass.		
43	Girls' High and Normal School.	Boston, Mass.	1852	Ephraim Hunt.
44	State Normal School.	Ypsilanti, Mich.	1847	D. P. Mayhew.
45	First State Normal School.	Winona, Minn.		Wm. F. Phelps, A. M.
46	Second State Normal School.	Mankato, Minn.		Geo. M. Gage.
47	Third State Normal School.	St. Cloud, Minn.		Ira Moore.
48	State Normal.	Holly Springs, Miss.		S. W. Garmen.
49	Normal and Manual Labor School.	Tugalo, Miss.		
50	North Missouri State Normal School.	Kirksville, Mo.	1867	J. Baldwin.
51	Fruitland Normal School.	Fruitland, Mo.	1869	J. H. Kerr.
52	State Normal School.	Warrensburg, Mo.	1871	Geo. P. Beard, A. M.
53	Coll. of Normal Instruction, Univ. of Mo.	Columbia, Mo.	1867	D. Read, LL.D.
54	Central Normal School.	Sedalia, Mo.		
55	City Normal School.	St. Louis, Mo.	1857	Anna C. Brackett.
56	State Normal School.	Peru, Nebr.	1867	H. H. Straight, A. B.
57	State Normal School.	Trenton, N. J.		Lewis M. Johnson, A. M.
58	Farmington Preparatory School.	Beverly, N. J.		Lewis M. Johnson, A. M.
59	State Normal School.	Plymouth, N. H.	1870	Prof. S. H. Pearl, A. M.
60	State Normal School.	Albany, N. Y.	1844	J. Alden, D.D., LL.D.
61	State Normal School.	Oswego, N. Y.	1861	E. A. Sheldon.
62	Liberty Normal Institute.	Liberty, N. Y.		M. B. Hall.
63	State Normal School.	Brockport, N. Y.	1866	
64	State Normal School.	Cortland, N. Y.	1866	Henry S. Randall.
65	State Normal School.	Fredonia, N. Y.	1867	Jno. W. Armstrong, D.D.
66	State Normal School.	Potsdam, N. Y.	1866	M. McVicar, Ph.D., LL.D.
67	State Normal School.	Buffalo, N. Y.	1867	
68	State Normal School.	Geneseo, N. Y.	1867	
69	Normal College of City of New York.	New York, N. Y.		T. Hunter, A. M.
70	Normal department Ingham University.	Le Roy, N. Y.	1857	S. D. Burchard, D. D.
71	Normal College, University of N. C.	Chapel Hill, N. C.		S. Pool.
72	St. Augustine Normal School.	Raleigh, N. C.	1868	Rev. J. B. Smith, D. D.
73	Central Normal School.	Worthington, Ohio.		W. Mitchell & J. Ogden.
74	Western Reserve Normal School.	Milan, Ohio.		
75	Northwestern Normal School.	Ada, Ohio.		H. S. Lehr.

SCHOOLS IN THE UNITED STATES.

Number.	Number of in-structors.	NUMBER OF STUDENTS.			Whole number of graduates.	Course of study.	Number of volumes in library.	Annual appropriation from State or city.	Annual expense to each student.	Time of anniversary.
		Male.	Female.	Total.						
1										
2										
3	3	83	102	185						September 25.
4	3		250	250		3 years..	400			July.
5	3	32	132	164	253	2 years..	1,500	\$3,000 00		May.
6	5	10	114	124	24	2 years..				
7	6	59	27	86	10	2 years..				Last week in May.
8										
9	6	108	59	167		2 years..				
10						3 years..	3,000	12,500 00	\$100 to 200	Third Thursday in June.
11	2	13	70	83						
12										
13			13	40						
14	3	93		93						
15										
16										
17										
18										
19	6	203	118	321		3 years..	250			First Monday of Sept.
20	8	61	74	135		2 to 4 yrs				
21										
22	1									
23	3	66		66						
24										
25										
26										
27	4	81	106	187		3 years..				
28										
29	2									
30										June 26.
31	16									Third Saturday in June.
32										
33	3					3 years..				
34	7	44	96	140		2 years..	1,200	2,000 00	180 00	Third Thursday in March.
35	7	93	49	142		2 years..		4,400 00		
36	11	24	139	163		2 years..	500	8,000 00		Last Thursday in May.
37	7	17	118	135		2 to 4 yrs	1,300	8,500 00	160 00	Third Thursday in July.
38	9		98	98			900	8,500 00	163 00	Last Tuesday of each term.
39	9		152	152			8,000	8,500 00	175 00	Last of Jan., & 1st July.
40	7	38	96	134			5,000	8,500 00	200 00	Second week in July.
41										
42										
43	33		630	630		3 to 4 yrs				September.
44	10	119	10	129		4 years..		10,000 00		
45	8	57	159	216		2 years..	3,000	5,000 00	160 00	Fourth week in June.
46	8	43	111	154		2 years..				
47	4	15	67	82		2 years..				
48	1	32	18	50		4 years..				
49										
50	13	193	122	321		4 years..				
51	2			52	11	6 years..				
52	5	42	45	87		2 years..				
53	5	20	10	30			3,000		140 to 200	Last Thursday in July.
54										
55	6						91	3,531 95	75 14	Third week in June.
56	4	41	51	92		3 years..	50		150 00	Last week in June.
57	7	36	256	292			3,000	10,000 00	150 00	Last Thursday Jan. & June
58	6	24	101	125			1,000	2,400 00	160 00	June and December.
59	8								24 00	
60	14		275	275	1,879		1,200	16,000 00	180 00	
61	8	88	344	432	314		241	16,000 00	160 00	July 8 and February 4.
62				77						July 8.
63										
64		60	75	135			750	12,000 00		
65	13									
66	13									
67										
68										
69	27		804	804						
70										
71										
72	2	39	34	73						September 27.
73										
74										
75	3	80	51	131		4 years..				

STATISTICS OF NORMAL

Number.	Name.	Location.	Date of organization.	Principal.
76	Orwell Normal Institute	Orwell, Ohio	1865	H. U. Johnson
77	National Normal School	Lebanon, Ohio		A. Holbrook
78	McNeely Normal School	Hopedale, Ohio	1852	W. Brinkerhoof
79	Teachers' Institute of Oberlin College.	Oberlin, Ohio		Jas. H. Fairchild, D. D.
80	Normal dep't Wilberforce University.	Near Xenia, Ohio		D. A. Payne, D. D.
81	Normal dep't Mount Union College ..	Mount Union, Ohio		O. N. Hartshorne, LL.D.
82	Normal dep't Willamette University ..	Salem, Oreg.		L. J. Powell, A. M.
83	Normal course Pacific University	Forest Grove, Oreg.		S. H. Marsh, D. D.
84	State Normal School	Millersville, Pa.	1859	E. Brooks, A. M.
85	State Normal School	Edinborough, Pa.	1861	J. A. Cooper
86	State Normal School	Bloomsburgh, Pa.	1869	H. Carver, A. M.
87	State Normal School	Mansfield, Pa.	1862	C. H. Verrill, A. M.
88	State Normal School	Kutztown, Pa.	1866	J. S. Ermentraut
89	Girls' Normal School	Philadelphia, Pa.	1848	G. W. Fetter
90	Normal departm't Lincoln University.	Oxford, Pa.	1854	I. N. Rendall, D. D.
91	Normal course Palatinate College	Myerstown, Pa.		H. R. Nicks, A. M.
92	State Normal School	Bristol, R. I.	1852	
93	Normal class Avery Institute	Charleston, S. C.		
94	Normal class Fish University	Nashville, Tenn.		Prof. Spence
95	Normal dep't Central Tenn. College ..	Nashville, Tenn.	1866	J. Braden, A. M.
96	Normal Department	Lookout Mountain, Tenn.	1866	C. F. P. Bancroft, A. M.
97	Normal dep't East Tenn. Wesleyan Un.	Athens, Tenn.		N. E. Cobleigh, D. D.
98	State Normal School	Johnson, Vt.	1867	S. H. Pearl
99	State Normal School	Randolph, Vt.	1867	E. Conant
100	State Normal School	Castleton, Vt.	1868	R. G. Williams
101	Hampton Normal Institute	Hampton, Va.	1868	S. C. Armstrong
102	Richmond Normal School	Richmond, Va.	1867	Andrew Washburn
103	State Normal School	West Liberty, W. Va.	1870	F. H. Crago
104	Normal department Storer College ..	Harper's Ferry, W. Va.		N. C. Brackett, A. M.
105	Normal dep't West Virginia College ..	Flemington, W. Va.		Rev. A. D. Williams, A. M.
106	State Normal School	Marshall Coll. P. O., W. Va.	1868	S. R. Thompson
107	State Normal School	Fairmont, W. Va.	1869	J. Blair
108	State Normal School	Whitewater, Wis.	1866	Oliver Arey, A. M.
109	Normal department Ripon College	Ripon, Wis.	1866	W. E. Merriman, A. M.
110	State Normal School	Platteville, Wis.	1866	E. A. Charleton
111	State Normal School	Madison, Wis.	1863	
112	State Normal School	Oshkosh, Wis.	1867	
113	Normal dep't Howard University	Washington, D. C.		Gen. O. O. Howard, LL.D.
114	Normal dep't University of Deseret ..	Salt Lake City, Utah.		John R. Park, M. D.

SCHOOLS IN THE UNITED STATES—Continued.

Number.	Number of in-structors.	NUMBER OF STUDENTS.			Whole number of graduates.	Course of study.	Number of volumes in library.	Annual appropriation from State or city.	Annual expense to each student.	Time of anniversary.
		Male.	Female.	Total.						
76	4	120	120	240	8	.....	.....	.....	\$150 00	June 22.
77	4	239	145	384	.....	.....	.....	.....	.....	.....
78	6	110	165	175	43	.....	.....	.....	150 00	June 23.
79	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
80	.....	16	15	31	.....	.....	.....	.....	.....	.....
81	4	.....	.....	242	.....	.....	.....	.....	.....	.....
82	.....	.....	31	31	.....	.....	.....	.....	.....	.....
83	12	.....	.....	.....	.....	.....	.....	.....	.....	.....
84	8	480	267	747	.....	.....	3,900	\$5,000 00	200 00	Third Thursday in July.
85	8	175	110	285	.....	.....	1,662	5,000 00	170 00	.....
86	10	210	151	361	.....	.....	630	5,000 00	184 00	Third Thursday in June.
87	11	112	110	222	.....	.....	2,000	5,000 00	178 00	.....
88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
89	11	.....	.....	.....	1,019	.....	500	11,925 24	2 75	February and July.
90	2	9	.....	9	.....	.....	.....	.....	.....	.....
91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
92	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
94	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
95	2	32	20	52	.....	.....	.....	.....	.....	.....
96	1	21	12	33	.....	.....	.....	.....	.....	.....
97	.....	.....	.....	.....	.....	2 years..	.....	.....	.....	.....
98	.....	.....	.....	98	.....	.....	.....	.....	.....	.....
99	4	.....	.....	346	.....	.....	500	.....	150 00	.....
100	.....	3	16	19	.....	.....	500	.....	160 00	Third Wednesday in Feb.
101	5	54	32	86	.....	3 years..	.....	.....	.....	.....
102	3	.....	40	40	.....	3 years..	400	.....	.....	October 1.
103	3	46	36	82	.....	2 to 4 yrs.	.....	.....	.....	.....
104	7	90	77	167	.....	.....	.....	.....	.....	.....
105	1	30	9	39	.....	.....	.....	.....	.....	.....
106	2	.....	.....	.....	.....	2 to 4 yrs.	.....	.....	.....	.....
107	2	20	.....	20	.....	2 to 4 yrs.	.....	.....	.....	.....
108	9	80	110	190	.....	.....	.....	.....	.....	.....
109	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
110	.....	.....	.....	.....	.....	3 years..	600	8,000-10,000	50 00	Last week in June.
111	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
112	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
113	2	1	13	14	.....	2 years..	.....	.....	.....	.....
114	2	.....	.....	.....	.....	.....	.....	.....	.....	.....

REFORMATORY STATISTICS.

Number.	Name of institution.	Location.	Name of superintendent.	When opened.	Number of inmates.			Committed during year.				No. discharged during the year.	When committed—	
					Male.	Female.	Total.	Number.	Native.	Foreign.	Average age at reception.		Could not read.	Could not write.
1	Industrial School.	San Francisco, Cal.	Edward W. Hatch.	1855			992	152	133	15	127			
2	State Reform School.	West Meriden, Conn.	Robert Turner.	1854			179	52	76	8	84	11	29	
3	Chicago Reform School.	Chicago, Ill.	Frank B. Alsworth.	1855			217	142	139	8	13	33	56	
4	House of Refuge.	Frankfort, Ind.		1868										
5	State Reform School.	Des Moines, Iowa.		1868										
6	House of Refuge.	Louisville, Ky.	P. Caldwell.	1865			134	66	30	36	13	103	14	38
7	House of Refuge.	New Orleans, La.		1847										
8	State Reform School.	Capitola, Cal.	F. W. Hutchinson.	1853			160	65	60	5	12	59	10	45
9	House of Refuge.	Waltham, Md.	W. R. Lincoln.	1855			358	115	101	14	14	36	23	69
10	State Reform School.	Westborough, Mass.	Benjamin Evans.	1848			261	93	93		12	213		
11	Nautical Reform School.	Boston, Mass.	Richard Matthews.	1860			270	183	160	23	15	90		
12	House of Reformation.	Dorchester, Mass.		1827										
13	State Industrial Girls' School.	Lancaster, Mass.	Rev. Marcus Ames.	1856										
14	State Reform School.	Lansing, Mich.	Charles Johnson.	1856			262	80	72	17	13	115	10	43
15	House of Refuge.	St. Louis, Mo.		1854										
16	State Reform School.	Manchester, N. H.		1856			82	50	50					
17	State Reform School.	Jamesburgh, N. J.	L. H. Sheldon.	1867			920	900	354	11	41	780		
18	Catholic Penitentiary.	West Farms, N. Y.		1862										
19	House of Refuge.	Randall's Island, N. Y.		1825										
20	Juvenile Asylum.	do.	Israel C. Jones.	1855			600	90	522		14	605		
21	Western House of Refuge.	Rochester, N. Y.		1849										
22	House of Refuge.	Cincinnati, Ohio.	H. A. Monfort.	1850			925	274	249	25	13	248		
23	State Reform School.	Lancaster, Ohio.	G. E. Howe.	1858			335	134	129	5	13	138		
24	Reformatory for Girls.	Columbus, Ohio.	John Nichols.	1869			48	44	31	13	15	1	7	
25	House of Refuge.	Philadelphia, Pa.	J. K. McKever and J. H. Lavery.	1828			547	312	194	118	14	304	68	92
26	Western House of Refuge.	Pittsburgh, Pa.		1854										
27	Providence Reform School.	Providence, R. I.	James M. Talcott.	1854			232	143	130	13	14	134	5	62
28	State Reform School.	Watbury, Vt.	William G. Fairbank.	1865			99	57				21	7	37
29	State Reform School.	Waukesha, Wis.	A. D. Hendrickson.	1860			206	114				13	3	
30	Reform School.	Georgetown, D. C.	F. W. Howe.	1869			46	55	55		13	9		

AMERICAN INSTITUTIONS FOR THE INSTRUCTION OF THE DEAF AND DUMB, JANUARY 1, 1872.

NAME AND DATE OF OPENING.	LOCATION.	CHIEF EXECUTIVE OFFICER.	Pupils, ¹ 1871.		Fe-male.		Semi-Male.		Teach-ers. ²		Fe-male.		Deaf-Mute. ³		Semi-Mute. ⁴	
			1871.	Male.	Fe-male.	Mute.	Male.	Female.	Male.	Female.	Male.	Female.	Mute.	Mute.	Mute.	Mute.
1817, American Asylum.....	Hartford, Conn.....	Edward C. Stone, M. A., Principal.....	292	181	111	20	17	10	7	5	2					
1818, New York Institution.....	New York City.....	Isaac Lewis Peet, M. A., Principal.....	580	341	239	35	30	18	12	7	10					
1820, Pennsylvania Institution.....	Philadelphia, Pa.....	Joshua Foster, Principal.....	272	151	121	30	13	11	2	3						
1823, Kentucky Institution.....	Danville, Ky.....	J. A. Jacobs, Principal.....	83	48	35	.....	6	4	2	3						
1824, Ohio Institution.....	Columbus, Ohio.....	Gilbert O. Fay, M. A., Sup't.....	388	227	161	36	21	9	12	10	1					
1830, Virginia Institution.....	Staunton, Va.....	Charles D. McCoy, Principal.....	92	47	45	2	6	6	.....	4	4					
1844, Indiana Institution.....	Indianapolis, Ind.....	Rev. Thomas MacIntyre, M. A., Sup't.....	269	142	127	38	14	8	6	.....	.....					
1845, Tennessee School.....	Knoxville, Tenn.....	S. F. Tomlinson, B. A., Principal.....	113	65	48	10	8	7	1	6	3					
1846, North Carolina Institution.....	Raleigh, N. C.....	Philip G. Gilbert, LL. D., Principal.....	132	73	59	14	9	7	2	2	4					
1846, Illinois Institution.....	Jacksonville, Ill.....	W. O. Connor, Principal.....	269	133	136	25	16	9	7	7	3					
1849, Georgia Institution.....	Cave Spring, Ga.....	J. M. Hingston, Principal.....	54	24	30	7	4	3	1	1	1					
1851, South Carolina Institution.....	Cedar Spring, S. C.....	William D. Kerr, M. A., Sup't.....	15	7	8	1	3	1	2	1	.....					
1851, Missouri Asylum.....	Fulton, Mo.....	J. A. McWhorter, M. A., Sup't.....	163	76	87	16	8	4	4	3	.....					
1852, Louisiana Institution.....	Baton Rouge, La.....	George L. Weed, Jr., M. A., Principal.....	47	26	21	6	4	3	1	1	2					
1852, Wisconsin Institution.....	DeJavan, Wis.....	Edbert L. Bangs, M. A., Principal.....	149	86	63	6	9	7	2	2	2					
1854, Michigan Institution.....	Flint, Mich.....	Rev. Benjamin Talbot, M. A., Sup't.....	150	80	70	25	11	9	2	2	6					
1855, Iowa Institution.....	Council Bluffs, Ind.....	John L. Carter, M. D., Sup't.....	119	72	47	16	7	5	2	2	3					
1856, Mississippi Institution.....	Jackson, Miss.....	J. Van Nostrand, M. A., Principal.....	34	22	12	2	3	2	1	2	.....					
1857, Texas Institution.....	Austin, Texas.....	E. M. Gallaudet, Ph. D., LL. D., President.....	104	87	17	21	11	10	1	1	3					
1857, Columbia Institution.....	Washington, D. C.....	Joseph A. Johnson, M. D., Principal.....	50	18	32	1	4	3	.....	.....	.....					
1858, Alabama Institution.....	Tallahassee, Ala.....	Warren Wilkinson, M. A., Principal.....	65	39	26	6	4	4	.....	.....	.....					
1860, California Institution.....	Oakland, Cal.....	Sister Stanislas, Principal.....	25	.....	25	.....	.....	.....	.....	.....	.....					
1862, Kansas Institution.....	St. Louis, Mo.....	L. H. Jenkins, M. A., Principal.....	47	26	21	8	4	3	1	1	1					
1862, St. Mary's Asylum (Catholic).....	Omaha, Neb.....	Sister Mary Ann, Principal.....	25	.....	25	.....	.....	.....	.....	.....	.....					
1862, Minnesota Institution.....	Buttelo, N. Y.....	Jonathan L. Noyes, M. A., Sup't.....	63	27	36	.....	6	1	5	5	.....					
1867, Institution for Improved Instruction.....	New York City.....	F. A. Rising, M. A., Principal.....	60	35	25	12	5	2	3	3	1					
1867, Clarke Institution.....	Northampton, Mass.....	Mrs. Harriet B. Rogers, Principal.....	53	28	25	11	5	1	.....	.....	.....					
1867, Arkansas Institution.....	Little Rock, Ark.....	Elmore P. Cantrill, M. A., Principal.....	46	26	20	37	5	.....	.....	.....	.....					
1868, Maryland Institution.....	Fredricks City, Md.....	Charles W. Ely, M. A., Principal.....	61	35	26	9	8	5	1	1	1					
1869, Nebraska Institution.....	Omaha, Neb.....	Archib Woodside, Teacher.....	90	61	29	9	3	2	1	1	1					
1869, Pittsburgh Day School.....	Pittsburgh, Pa.....	Miss Sarah Fuller, Principal.....	25	12	13	13	3	2	2	1	1					
1869, Boston Day School.....	Boston, Mass.....	Jonathan Whipple, Jr., Principal.....	35	17	18	7	7	4	2	1	1					
1870, West Virginia Institution.....	Mystic, Conn.....	Romney, West Va.....	45	19	26	8	4	.....	.....	.....	.....					
1870, Chicago Day School.....	Chicago, Ill.....	D. Greenberger, Principal.....	4	3	1	8	1	1	1	1	1					
1870, Oregon Institution.....	Salem, Oregon.....	William S. Smith, Principal.....	49	30	19	8	4	2	2	2	1					
1870, Cleveland Day School.....	Cleveland, Ohio.....	Miss M. A. Seeber, Teacher.....	14	9	5	8	2	1	1	1	1					
1871, .....	.....	.....	11	4	7	1	1	.....	.....	.....	.....					
Institutions in the United States.....	.....	.....	4,068	2,277	1,791	421	260	161	99	80	30					
1864, National Deaf Mute College ⁵	Washington, D. C.....	E. M. Gallaudet, Ph. D., LL. D., President.....	54	53	1	16	7	7	.....	.....	.....					

* Under this head are included the semicircular and all the deaf who have acquired some knowledge of language through the ear.
¹ For the 1871-72 session are for school, and one for 1871-72, by a system of oral instruction.
² The National Deaf-Mute College is a distinct organization within the Columbia Institution.
³ Not including the semi-mute and students are included in the statement of the Columbia Institution given above.
⁴ Its professors

APPENDIX.

THE DEVELOPMENT OF RELIGIOUS INSTITUTIONS IN THE UNITED STATES,
UNDER THE VOLUNTARY SYSTEM OF EQUAL RELIGIOUS RIGHTS
TO ALL, WITHOUT STATE PREFERENCES OR STATE
SUPPORT TO ANY FORM OF FAITH.

GIVING

A condensed summary of the origin, rise, progress, growth, doctrines, and present condition of each religious sect and denomination in the United States, explaining, from the writings of each, the points in which they differ from the others, and giving the localities in which they are most numerous. To which is added the progress and present condition of each denomination in the education of the ministry, in denominational or sectarian schools, in Sunday schools, in the number and elegance of their houses of worship, and in the support of Home and Foreign Missions, Bible, Tract, and Publication Societies, and other benevolent and charitable institutions, entirely devoid of sectarianism.

The Growth and Progress of Religious Denominations in the United States for the past Hundred Years.

The religious character of the Colonies in 1770, was substantially that which had been imposed on them at the time of their first settlement, and was of necessity very diverse in different sections. Massachusetts and Connecticut, (or rather the different colonies which had united under these names) had been founded by the Puritans or Independents, seceders from the Church of England, who had organized sometimes as independent churches during the reigns of James I. and Charles I. These were, in 1770, the predominant churches—"the standing order," as they were termed, and the established religious body of the colonies, though Episcopalians, Baptists, a few Methodists, and a considerable number of "Separates" were tolerated, and by "signing off" or avowing themselves adherents to one or the other of these denominations, and pledging themselves to sustain it, their ecclesiastical taxes could be, in part, remitted. The "Separates" were mainly converts under the preaching of Whitfield and his followers in 1740-50, who were opposed to an established church, and believed in the voluntary system. Maine was largely settled from Massachusetts, and followed its lead in religious matters. New Hampshire had two distinct religious elements in its early settlement—the Puritan or Congregational—and the Presbyterian, represented by the Protestant Irish settlers of several of its towns. At the period we speak of there was a larger measure of toleration of other denominations there than in Massachusetts. Rhode Island had been settled by Baptists driven from Massachusetts a hundred and forty years before, on account of their avowal of their religious belief. It was the only one of the New England colonies in which, even at that time (1770,) there was complete liberty of conscience, and its population were of all denominations, Baptists, Quakers, Separates, Independents, Presbyterians, Episcopalians, Roman Catholics, Fifth Monarchy Men, etc., etc. Vermont, or "New Hamp-

shire Grants," was not an independent State till after the Revolution, and its few inhabitants were of all shades of religious belief, or of none, at this time. New York, originally settled by the Dutch, had had the Reformed Dutch or Holland Church for its established church till 1684, but after its conquest by the English the church of England had in turn become the established religion, and under some of the colonial governors, Presbyterians, Baptists, and Quakers were persecuted and imprisoned. This persecution had, however, ceased some years before this period, and though the Episcopal church was still the state church, its prestige waned subsequently during the years of the revolution, from the fact that, in that colony, the greater part of its members were Tories, and sympathizers with the British. The Presbyterians were considerably numerous in New York, the Baptists and Methodists less so, and there were a few Roman Catholics.

Pennsylvania had been settled by the Quaker Penn, for a refuge for the sorely persecuted Quakers of England and America, but it was open to all denominations, and to those who had no religious beliefs. The Quakers or Friends were predominant in numbers, but Episcopalians, Presbyterians, Baptists, Methodists, Lutherans, and Roman Catholics, were all received cordially.

New Jersey and Delaware had a moderate Swedish and Danish (Lutheran) element, but the former had a much larger constituency of Irish Presbyterians, and was, before the Revolution, probably the most thoroughly Presbyterian colony of the whole thirteen. There was not, however, at this time, so far as we can learn, anything like an established church in the colony.

Maryland was founded and settled by Lord Baltimore and his kinsmen, the Calverts and Carrolls, all of them Roman Catholics; but to their honor, be it said, there was complete religious toleration from the first, and in 1770 the Catholics had but a slight majority among the inhabitants; still

it was the predominant faith of the people of the colony.

Virginia, settled by the younger sons of the English nobility and their friends at first, and its population subsequently largely increased by the great number of "redemptioners," (paupers, convicts, etc., sent over and sold for a term of years to pay for their passage,) had up to the commencement of the Revolution, recognized the church of England as the established church of the colony, and at times had persecuted sharply other denominations. Through the influence of such men as Patrick Henry, Thomas Jefferson, and others, who, though not religious men themselves, yet saw the necessity for religious liberty, that principle was incorporated in its first constitution as a State.

North Carolina and South Carolina were settled largely by Protestant Irish (Presbyterians,) Huguenots (Protestant Reformed Church,) Moravians, and other Germans, mostly Protestant; their constitutions and charters were favorable to religious liberty.

Georgia, the youngest of the colonies, was largely settled by the followers of Whitfield and Wesley, and was, moreover, a refuge for persecuted Protestants from the states of continental Europe. The largest religious liberty existed here from the first.

Such was the religious, or rather denominational history of the thirteen colonies when they came together by their representatives in the Continental Congress. Every form of christian belief then known, had its adherents in one colony or another. Most of them assimilated to a considerable extent by their years of intercourse during the war, abolished all restrictions on complete religious liberty (where any existed) before the adoption of the constitution, but Massachusetts and Connecticut retained theirs till the adoption of new and revised constitutions in the early part of the present century. It is to be said in their favor, however, that these restrictions were not, after the revolution, so severe or onerous as those under which the dissenters in England groan to-day.

Meanwhile there had grown up a second tier of States beyond the Alleghanies, which were now knocking for admission to the Union. What were the religious denominations to be found in these? In general, we may answer, that they were the same with those of the States from which most of their inhabitants had come. Thus Ohio, settled largely

from New England, especially in its northern half, had a predominance of Congregationalists, with some Methodists and Baptists in that section, and in the southern portion which was peopled from Pennsylvania and Virginia, a large proportion of Presbyterians, Lutherans, Quakers, and many German Methodists, with some Episcopalians and Baptists. Kentucky and Tennessee had at this time more of the Presbyterian element, modified by the great awakening of 1801-2 to the Cumberland Presbyterian creed, while Baptists and Methodists alike were gaining the affections of large numbers of the people. A few years later other forms of faith made great inroads into the ranks of the older denominations. Alabama, settled mostly from Georgia and Tennessee, though with some admixture of northern men, drawn thither by its commercial facilities, had many representatives of most of the older denominations, but did not in its early history give much heed to the apostles of new faiths. The purchase of Louisiana in 1803, added a considerable Catholic element to the religious population of the country, not only in Louisiana proper, but in Mississippi, and in the states and territories subsequently organized west of the Mississippi. In fact there were scattered Catholic churches in all the French and Spanish forts and trading stations throughout the northwest, and these, though very feeble and widely scattered, served as *nuclei* for more extensive establishments as the country was settled. Detroit, Michigan; Vincennes, Indiana; Vandalia, Kaskaskia, and Joliet, Illinois; two or three points in Wisconsin, and as many in Illinois, St. Louis, and some other points in Missouri, Bardstown, Kentucky, and missions in Arkansas and Kansas, indicate how zealously the French Catholic priests had planted their outposts throughout the Mississippi valley. As yet, however, the Catholics were not strong anywhere in the United States, and it was not until immigration commenced on a large scale from Ireland and Germany that they attained to a prominent position among the religious denominations of the country. The German immigration, as well as that at a later date from Sweden and Norway, also largely increased the number of Lutheran and German Reformed churches, and that from England, Scotland, and the north of Ireland, enured mainly to the benefit of the Presbyterians, and Methodists, though a minority were Baptists.

Several denominations, some of them now among the larger religious bodies of the country, have either originated here or had their principal development in the United States. The first of these in the order of time was the Shakers, or followers of Mother Ann Lee. This noted religious leader was born and lived for many years in England, and claimed to have received her first and principal revelations there; but she had not a score of adherents when she came to the United States in 1774, and it was not till about 1780 that she had any considerable number of disciples, and it was not till 1805 that the societies of the Shakers were established at any great distance from their first center, Watervliet. The disciples, or followers of Alexander Campbell, were first organized as a distinct body of Christians about 1810, but did not increase very rapidly till about 1831. They are now about in the fifth or sixth rank among the religious denominations of the country.

The United Brethren in Christ, (not Moravians, but German Methodists,) date back to 1760, when Otterbein and Boehm commenced their missionary labors; but their principal development has taken place during the present century.

The Mormons organized their first community or church in 1831, though the professed revelations of Joseph Smith date some years earlier. Various methods of classification of religious and irreligious societies have been attempted, but all of them are liable to some objection. The most common classification is that of Roman Catholics, Protestants, Infidels or Unbelievers in Christianity, and Pagans. This answers well enough for a generic division, but when we come to a minute classification we find a difficulty. The Roman Catholics, though divided into several orders or societies which are more or less hostile to each other, such as Jesuits, Dominicans, Franciscans, Benedictines, Paulists, Lazarists, etc., have yet this common bond of union that they all acknowledge allegiance to the Pope, while Protestants, however we may classify them, will hardly come under any strict rule of division. One classification is into Trinitarians and Anti-Trinitarians; but to this it may be objected that neither party are wholly Protestant, the Roman Catholics being Trinitarians as well as most of the Protestants, and a part of the Baptists, and a por-

tion of the Anglican churches, denying that they are Protestants, as do likewise some of the Anti-Trinitarians. This division is liable to the further objection that it arrays a very large body of religionists on one side against a comparative handful on the other.

The division into Orthodox and Heterodox, is liable to the objection that there is no universally recognized standard of Orthodoxy, and to call a man Heterodox because his belief on all points was not the same with that of some other man would be invidious. The division into Evangelical and Unevangelical is equally objectionable on the ground of its indefiniteness, with the added difficulty that it would divide two denominations, the Anglican churches and the Unitarians, a part of each claiming and receiving the title of Evangelical, and the other part rejecting it. The division of the denominations into Calvinists and Arminians is perhaps as fair as any, though several denominations have both classes in their membership. That into Baptists and Paedobaptists is faulty because, though no Baptist, i. e. Immersionist, is a Paedobaptist, that is, an advocate for the baptism of infants, yet many Paedobaptists occasionally practice immersion, as for example, the Methodists, the Congregationalists, and the Episcopalians. It is liable to another difficulty, viz., that some of the organizations not reputed Christian, such as the Mormons, practice immersion.

In the attempted subdivision of the Infidel or unbelieving class, we are met with still greater difficulties. The Deist, especially, if an Israelite, and a believer in the Old Testament scriptures, will object strenuously to be ranked with the sceptic whose only God is nature, and whose highest hope for the future is in annihilation, or with the Comtist who recognizes no divinity of greater knowledge or power than himself, or the Atheist, who believes that all things are the result of chance. Between these extremes there are an infinitude of opinions, no two of which can be reconciled with each other, even to the extent of a common classification. Of Paganism there are but comparatively few representatives—the Indian tribes in the West, the Chinese, who seem to be in about equal proportions, Buddhists, Sintoists, and followers of Confucius, the Alaskan Indians, and Esquimaux, whose religion seems akin to Shamanism, the small colonies of Japanese, (Buddhists) and the traces of Fetichism found

1870. The denominations have been taken generally in the order of their membership; but the smaller churches which affiliate with the larger ones in their doctrines and ordinances, have been considered in the same connection, in preference to a rigid classification on the basis of number of members.

The following table exhibits as accurately as they can be obtained from official and other sources, the statistics of the various religious and irreligious sects in the United States, as reported at or near the close of

Religious Statistics of the United States in 1870.

Denomination or [Sect.]	Bishops.	Clergy- men.	Dioceses, or Presbyteries, &c.	(Churches, chapels, or Parishes.)	(Church Edifices.)	Sittings.	Members of Churches, (Congregations, or Parishes.)	Adher- ent Popula- tion.	(Value of Church Edifices.)	(Contributions to Beneficent Objects.)	Sunday Schools.	Sunday School Scholars.	Additions to Member- ship during the year.	Academies and Sem- inaries under control of denomination.	(Colleges and Theolog- ical Seminaries.)	Newspapers and Peri- odicals of the Denomination.
Roman Catholics.....	7	3,505	55	4,972	3,624	1,290,000	3,354,000	3,800,000	\$47,253,000	\$7,957,438	16,363	290,000	180,000	65	25	25
Methodist Episcopal.....	19	19,170	72	12,656	12,656	3,005,020	1,298,558	5,000,000	57,124,000	57,124,000	1,143,584	108,000	155	62	26	26
Meth. Church South.....	10	7,386	30	4,250			753,017	2,856,000				30,436		11	15	15
Other Methodists.....	15	3,205	30	4,725			753,017	2,856,000				30,436		11	15	15
Baptists.....	8,787	728	15,143	14,076	3,508,500	1,221,349	5,250,000		49,203,000	8,947,620	3,594	337,647	102,110	55	42	42
Free Will Baptists.....	1,145	135	1,386				60,000	200,000				13		5	3	3
Disciples.....	1,797		2,475				487,223	1,500,000				16		11	26	26
Methodist Episcopal, Tunk ers, Church of God, &c.....	950		990	700			88,000	275,000				2		6		
Seventh Day, Six Prin. Anti Mission, and other Baptists.....	700		800		4,327	1,390,000	70,000	200,000	19,471,500	8,440,121	4,783	448,857	53,450	1	3	3
Presbyterians.....	4,238	810	4,238		1,280	3,900,000	44,501	2,400,000		872,555	672	47,317	7,809	26	26	26
Presby in Ch. South.....	803	66	1,460				82,014	325,000						2	2	2
Ref. Ch. Presbyterians.....	190	11	187				18,000	72,000						7	2	2
3 distinct bodies.....	553	64	729	655		165,000	18,000	72,000	2,965,000	807,126	600	42,907	8,117	2	4	2
United Presby terians.....							80,000	220,000						3	3	3
Cumberland Presby- terians.....	1,316	126	2,000		1,817	450,000	60,000	220,000		7,727		7,727		17	17	17
Reformed (Dutch).....	498	53	904		428	120,000	61,344	255,000		1,187,681		48,411	5,922	3	3	3
Congregationalists.....	2,170	22	2,315	2,175		600,000	306,518	1,754,000	9,683,600	6,316,000		27,373		24	24	24
Anglican Church, or Proc. Episcopal.....	2,786	48	9,605	2,805		5,685,000	220,000	1,080,000	13,000,000	5,002,732		261,465	22,115	20	20	20
Lutheran.....	2,086	52	3,641	3,239		800,000	495,577	1,308,500	9,713,000	8,654,378		20,929	22,010	16	16	16
German Reformed.....	556	35	1,173	1,160		260,000	217,310	555,000	2,750,000	2,676,453	1,019	49,900	12,776	7	10	11
United Reformed in Christ.....	4	1,647	38	3,653	1,474	483,099	118,655	364,000	2,608,000	625,651	2,420	112,425	10,000	5	10	5
United Brethren.....	6	386	21	54	28	18,000	11,855	35,000	100,000	120,000		5,959		1	1	1
(Moravians).....							39,000	60,000	1,250,000	100,000				5	5	5
Unitarians.....	821	84	913	825		608,000	46,000	200,000	1,300,000	200,000		8		6	6	6
Christian Connection.....	3,000	9	6,000				300,000	600,000				65,000		3	1	1
Friends or Quakers.....							80,000	240,000						5	1	2
Heb. Kate & Progres- sive Friends.....			8				40,000	120,000						5	1	2
New Jerusalem Ch., or Swedenborgians.....	63		74	210			5,000	25,000		63,000				1	1	1
Jews.....							30,000	50,000				17		1	3	7
Belshial, Radical, or liberal Clubs.....												5		1	1	1
Mormons.....							50,000	75,000				10		1	1	1
Spiritualists.....	3	240					50,000	250,000								5
							50,000	250,000								10

*These seem to be members of the congregations only. The number of communicants is stated to be 96,728, and unconfirmed members 68,312.

CHAPTER II.

HISTORY AND PROGRESS OF THE DIFFERENT DENOMINATIONS.

I. ROMAN CATHOLICS. The adherents of the Roman Church in the United States were, as we have already seen, just before the American Revolution, except in Maryland, but a very small proportion of the population. They had small congregations in New York, Philadelphia, and perhaps, two or three other large towns. In Baltimore, they were the leading denomination, and in several towns of Maryland they had congregations. In sections which soon after came into the Union as states or organized territories, their congregations were scattered somewhat widely. In North Eastern Maine, the Arcadian settlers, mostly French or of French extraction, were generally devout Catholics; and a few priests with their flocks were found along the northern line of New England and New York. Detroit had a very considerable Catholic element in its population from the first; and farther west, at several points in Illinois, Wisconsin, Iowa, and especially in Missouri and below in the Mississippi Valley, among the French and creole population of Louisiana Territory, churches and cathedrals were comparatively numerous. Farther west, in Texas and California, as well as in Mexico, New Mexico, and Arizona, all at this time under the control of Spain, and subsequently of the Mexican Republic, Catholicism had been for two centuries the established religion of the state, and Indians, Mexicans, and Spaniards of the pure blood were alike, nominally at least, enrolled among its numbers. The missions, churches and cathedrals, many of them in ruins, which dot the prairies and oases of the vast territory acquired by the war of 1846, show that in former times, a very considerable, though mainly a native population was subservient to this faith. It was not, however, till after 1820, when the vast tide of immigration from Ireland and from Catholic Germany, with its occasional additions from France, Italy, and Spain,

began to flow in upon us, that the Roman Catholic church assumed anything like its present proportional magnitude. Its outposts were indeed already planted, and it had its centers of influence, its *nuclei* around which it could gather its incoming hosts. But prior to 1820, it probably ranked in the number of its communicants not higher than fourth or fifth among the religious denominations of the country. It is stated on good authority (that of a Roman Catholic archbishop), that more than five millions of Catholic emigrants have landed upon our shores since 1820. Of course many of them have apostatized; many more have died, and their children have been reared in other faiths, or in no faith at all. In these ways only can we account for the fact attested by the highest Roman Catholic authority, that their communicants do not to-day number over 3,500,000. Their clergy have not been wanting in zeal or fidelity to their faith; and no denomination in the country has provided so well or so promptly for the maintenance of religious worship as they. They have not been persecuted for their faith, or their numbers would be larger; but there has been on the part of immigrants a strong disposition, on coming to this country, to throw off all religious restraints under the impression that this was one of the requisites of national freedom.

With this brief sketch of its history, we proceed to give the leading doctrines of the Roman Catholic Church, stating them in this case, as we shall in that of all the other denominations, in the exact language of their own ablest and most representative writers, as the only course which will render strict justice to each denomination. The late Archbishop Kenrick of Baltimore, one of the ablest writers and most accomplished scholars of the Roman Church, thus states its doctrines: "The chief doctrines of the Church regard the unity of the divine nature in three dis-

inct divine persons, and the incarnation of the second divine person, through the mysterious operations of the Holy Spirit in the Virgin Mary, and his death on the cross for the expiation of the sins of mankind. The belief of the incarnation is the ground and motive of the high veneration which is entertained for the Virgin, who is styled Mother of God, because Christ her son is God incarnate." (Since the death of Ab'p Kenrick, the dogma of the Immaculate Conception of the Virgin Mary, regarding her as born as free from sin as Christ himself, has been proclaimed by the Pope as a fundamental doctrine of the church.) "To her is ascribed all sanctity and perfection which can be bestowed on a mere creature, and she is held to have been free from all stain of sin by a special privilege granted her, that she might be worthy of the dignity for which she was divinely chosen. The mystery of the redemption is prominent in the teaching and worship of the church. Christ suffered and died, as man, to atone for the sins of our first parents, and the sins of all mankind. His death fully expiated the guilt of sin, and presented an atonement in every respect perfect. Yet all men are not justified and saved, but those only to whom the redemption is applied by means divinely prescribed. Baptism is believed to be a remedy for original sin, applicable even to infants. Adults having the use of reason must believe in Christ and repent of sin, in order to receive the benefit of the atonement. From those who have forfeited baptismal grace, fruits of penance are required as evidences of their sincere conversion to God, and as conditions to entitle them to the application of the merits of Christ. Nothing that man can do, can take away the guilt of sin, or prove an adequate satisfaction for it; but God requires the humiliation of the sinner, and accepts his penitential works, which derive value from the ransom offered by Christ. They add nothing to it, but they become acceptable through it. Christ is the spiritual Mediator through whose blood we must sue for pardon and salvation. The worship of the church is given to God only—the one Eternal Being in the three divine persons—and the incarnate Word, God consubstantial to the Father. Inferior religious honor, which may be called worship in a qualified sense, is given to the Virgin Mary, on account of the gifts and graces with which God has endowed her, and her exalted dignity as

Mother of God incarnate. The angels, namely, incorporeal spirits reigning with God, are honored as his creatures, in whom his perfections are reflected, and his messengers through whom he has manifested his will. Saints, those who have proved faithful in the divine service to the end, and are already crowned with glory in the kingdom of God, are venerated likewise for their triumphant virtue; the martyrs especially, who died amid torments rather than deny Christ, and the virgins, who throughout life preserved the purity of their affections, are deemed worthy of high honor. But there is an essential difference between the honor given to the creatures of God, and that which belongs to God alone. He receives the submission of the understanding and the will, the homage of the affections. He is acknowledged to be the essential Being, the supreme Lord, the beginning and the end of all things. Sacrifice is given to him only. Prayer, in its strict acceptance, can be offered to him only, the Giver of every good gift. Grace and salvation depend upon his bounty and mercy. Litanies and prayers to the saints are only appeals to them to intercede with God for us through Jesus Christ. They are not supposed to be omniscient or omnipresent; but they know, in God, the pious desires as well as the penitential sighs of the faithful. Respect is paid to the crucifix, which recalls to our mind the sufferings of Christ for our redemption, but it does not terminate in the symbol or material object. The kissing of the image, the bending of the knee, the prostration of the body in the ceremonial of Good Friday, are all directed to Christ, our Redeemer. So the images of the saints awake the remembrance of their virtues. The bowing of the head to a statue, or the burning of incense before a shrine, is referred to the saint whose memory is honored for his love of God and his zeal for the divine glory. Relics, that is objects used by the saints, or particles of their remains, are venerated for the relation they bear to them. The fall of the first parents of the human race is the fundamental doctrine on which the belief of the mystery of redemption depends. . . . Original sin is that transgression which is common to the whole human family, each one being estranged from God, and liable to his wrath, in consequence of the act of the heads of the race. The natural powers have been weakened by the fall. The freedom of the human will remains, but it is

less vigorous than in our first parents. Our nature is not vitiated and dependent, but it is prone to evil and exposed to violent temptation. A Redeemer was given us, in the person of Christ, who, being God-man, atoned by his sufferings for the sin of our first parents, and merited for us all grace by which temptation may be overcome. Actual sin is the willful transgression of the divine law by individuals having the use of reason. Mortal sin is any act, speech, desire, or thought grievously opposed to the natural or divine law. Sins which imply no direct or grievous opposition to the law of God, are styled venial, because their pardon is easily obtained, since they do not separate the soul from God. Slight impatience, rash words, vain self-complacency, may be venial. Deliberate hatred, gross calumny, acts of violence, not to speak of drunkenness, lust, and murder, are mortal sins. The distinction of sins is not derived from the individual who commits them, although they may be aggravated by his personal obligations. Forgiveness of sins, even the most heinous, is promised to the penitent. Sorrow for having committed them is a necessary disposition in order to obtain it. Perfect sorrow, which is called contrition, springs from divine love, and leads us to detest sin as opposed to the goodness of God and to his eternal perfection. Attrition, is sorrow of a less perfect kind, arising from an experience of the evil consequences of sin, and the dread of the punishments which await it hereafter. If it wean the heart from sin, and inspire an effectual detestation of it, so as to be accompanied with a firm resolution of amendment, it is held to be useful and salutary, and such as may dispose for pardon in the sacrament of penance. The forgiveness of sin properly belongs to God, who is offended. Christ, as God-man, forgave sin, and authorized the apostles to impart forgiveness or withhold it. The power is judicial, since they may bind or loose, retain or forgive; on which account a confession of sin is required from every applicant for its exercise. When this is made with sincerity, humility, sorrow, a willingness to repair the wrong committed, and a determination to shun the occasions of sin, the priest absolves the penitent. This absolution is a judicial sentence, deriving its force from the divine institution. The sacraments (seven in number) are rites instituted by Christ our Lord, as instruments and means of grace to apply to our

souls the merits of his sufferings and death. They are said to contain and confer grace, technically *ex opere operato*, because they are effectual means divinely chosen to impart it, where no obstacle is presented by the receiver. Certain dispositions, however, are required on the part of adults who desire to partake of them. Faith and compunction are necessary on the part of the applicant for *baptism*. Sorrow, with a firm purpose of amendment, is required from the professed penitent, in the sacrament of *penance*. The strengthening grace of the Holy Spirit is granted, by the *laying on of hands* with prayer, to the baptized believer, whose heart is free from willful sin. Sin is forgiven to the dying man who with penitence and hope receives the mystic *unction*, and for whom the prayer of faith is offered up. *The imposition of hands* is available for the communication of sacerdotal power, even to the unworthy candidate, but grace is given to him who is called by God, and who with humility corresponds to the divine vocation. *Marriage* is a great mystery, the image of the union of Christ and the Church, to be celebrated with purity of affection. *The Eucharist*, the chief sacrament, is to be approached with hearts cleansed from sin, under penalty of becoming guilty of the body and blood of the Lord, and incurring condemnation.

It is not easy to reconcile the exercise of free will with the divine foresight. We cannot understand how it is possible for us to act independently, and of our own determination, when God has foreseen our action. It is sufficient to know and feel our freedom, without sounding the depths of divine knowledge. It suffices then to admit that without the grace of Christ we can do nothing, and to hold that we can do all things in Him who strengthens us. Everlasting beatitude, consisting in the contemplation and enjoyment of God, is the reward promised by Him on condition of the fulfilment of His commandments, and bestowed gratuitously on baptized infants or others incapable of personal acts. The punishment of grievous sin is eternal. Impenitent sinners are forever separated from God, and suffer torments. Those who die guilty of slight faults or debtors to divine justice, are withheld for a time from the enjoyment of Heaven (and suffer the pains of purgatory). The glory of heaven is immediately attained by baptized infants dying before the use of reason, by

adults dying immediately after baptism, by martyrs, and by all who die with perfect love of God, and free from sin or debt of punishment. The soul only is admitted to happiness. The body is subject to dissolution, but is to be raised at the end of time, in order to be reunited to the soul, and made partaker of her glory.

The teaching of Christ our Lord, becomes known to us especially by the preaching of the ministry, tracing back their commission to the apostles. Solemn definitions of faith are the most authoritative forms of this preaching. They are declarations not merely of doctrines contained in the written word, but of revealed truths, whether written or unwritten. Christ himself left nothing in writing; several of his apostles wrote much, and two other sacred writers composed narratives of his life and teaching; but many things belong to the deposit of doctrine which were not explicitly placed on record. The body of bishops feel themselves authorized to propose as revealed truth whatever has come down from the beginning in the church, and been generally acknowledged to appertain to doctrine. In cases of difficulty, when doubts have been raised with regard to some tenet, they feel themselves competent to examine the evidence, and decide whether the doctrine has been revealed. After a definition, it is no longer allowed to question a truth sealed with their approval. Infallibility in judgment is claimed for the body of bishops with their head, the bishop (pope) of Rome. (The infallibility of the pope was declared one of the cardinal doctrines of the Roman Catholic Church by the Council of Rome in 1870—71.) By the infallibility in judgment of the bishops, is meant the providential guidance of the Holy Spirit, by which they are directed and enlightened in doctrinal decisions, that they may not mistake error for truth or propose as divinely revealed what wants the seal of divine authority. The tribunal of the pope is universally acknowledged (in the Roman Catholic church) as competent to pronounce judgment in controversies which regard faith, and its decrees, directed to the body of bishops or to the church at large, proposing doctrines under penalty of excommunication, when acquiesced in by the bishops, are final and irreversible.

The Church accepts the Divine Scriptures is the word of inspiration, written under the impulse of the Spirit of God, and to be re-

ceived with all faith and veneration. To the books of the Old Testament, according to the Jewish Canon, she adds certain other books (usually known as the Apocrypha) of ancient testimony, usage, and tradition derived from the apostles. The books of the New Testament included in the Canon, those adopted as inspired by the Council of Trent. The Church claims the supreme authority of determining the meaning of the Scriptures, in conformity with the general teaching of the fathers, that is, the ancient Christian writers. Faith, according to the Roman Catholic view, is the assent of the human mind to divine truth as it is proposed and attested by the church of God. The truth must be revealed, and it must be propounded by the church. Faith is necessary to salvation, so that without it, it is impossible to please God. The wanton and proud rejection of a single point of revealed doctrine involves shipwreck of faith. Hence the plea of invincible ignorance is the only one which Roman Catholic divines admit as of any avail in behalf of those who reject any of the doctrines which the Church has propounded as revealed, and only God can determine with certainty the individual for whom such plea may be available. All baptized children are claimed by the church as her own, since baptism is the sacrament of regeneration, and they continue such until by their willful profession of condemnation error they forfeit their birthright. The principles of the Catholic Church with regard to civil duties, are highly conservative. She feels bound to respect established authority and enforce, by moral suasion, obedience to those in high station, and she uses every occasion to insinuate the axiom, that religion is the only sure basis and strong bond of security. The duties of her members are dependent on the providential position in which they find themselves. They are to support law and order, and fulfil faithfully every obligation to society.

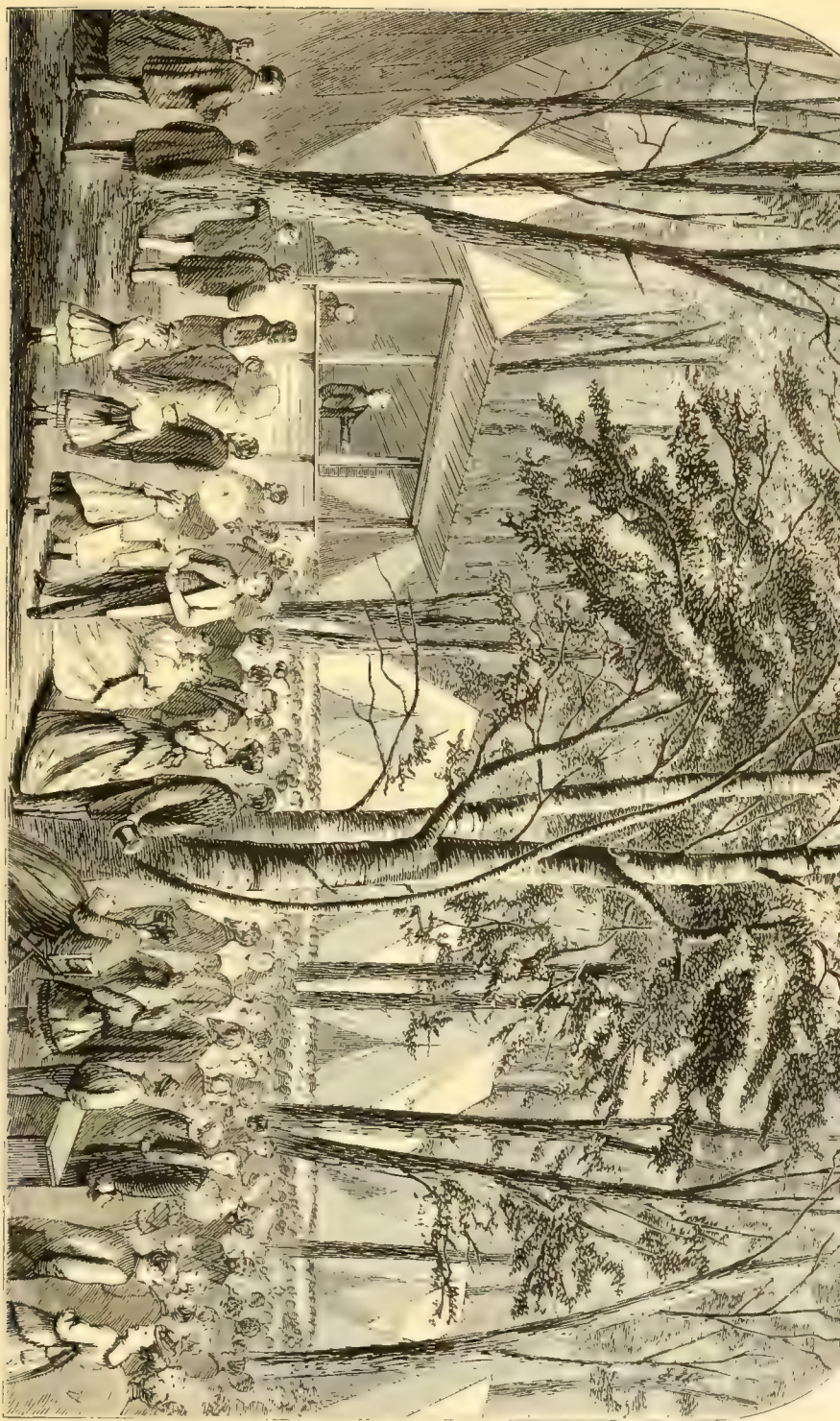
By *discipline*, Catholics understand all that appertains to the government of the Church, the administration of the sacraments, and the observance and practice of religion. The essential *worship* consists in the sacrifice of the mass, which, although mystical and commemorative, is real and propitiatory, being a continuation of the sacrifice of the cross. Vespers, or evening prayers, are solemnly sung, the psalms of David, the songs of the Virgin Mary, and pious hymns and

prayers being used. In the cathedral churches, other portions of the divine office are sung at various hours of each day, by clergymen, called canons, devoted to this duty. Numerous festivals are also celebrated to honor the divine mysteries and present them to the devout contemplation of the faithful. Many are solemnized in honor of the Virgin Mary, the apostles, martyrs, confessors, virgins, and saints of every class, whose virtues are thus set before the faithful for their imitation. Fasting is also a part of church discipline. Forty days before Easter (the Lenten Fast) are devoted to this exercise. Ember days, viz., Wednesday, Friday, and Saturday, in each of the four seasons, are observed as fasts to obtain the divine blessing, and worthy ministers for the church, ordinations being held at those times. The eve of great solemnities is observed by fasting, in order to prepare by penance for their celebration. Abstinence (from meat) is observed on each Friday of the year, and in some dioceses, on Saturday also. All these penitential observances are matters of church law, which admits of dispensation. The rites of the mass, and the ceremonies used in the administration of the sacraments, appertain to discipline, which admits of variety and change, although great deference is shown for ancient usage. For this reason, the Latin liturgy, used from early times in the Roman church, is still employed by the celebrant, although instructions are given in the vernacular language, and facilities are offered to the faithful for praying in a manner suited to their capacity. The changes which have been made are in the manner of administering baptism, and the Eucharist, and penitential discipline. The solemn mode of baptism was originally by immersion. The candidate used to descend into fountains, or streams, or rivers, and sink beneath the waters under the pressure of the hands of the sacred minister. In cases of necessity and danger, less solemn modes were used, which, from being frequent at length, after the lapse of ages, became universal. In like manner, the Eucharist, having been instituted by our Lord under the forms of bread and wine, was generally administered under both kinds for many ages. Exceptional cases were always admitted, which at length proved so numerous as to supersede altogether the ancient usage. The church claims the right to regulate, at her just discretion, whatever regards the manner

of administering the sacraments, while she holds their substance to be inviolable. The change in regard to penance, has reference mainly to the issue of indulgences, i. e. pardons for offences justly liable to penitential discipline. These, which were generally *plenary*, were not directed to the forgiveness of sin which needed the sacramental remedy, but to the remission of the temporal punishment, which was often exacted by divine justice from those whose sins had been pardoned. They served as incentives to works of piety, such as almsgiving, fasting, and prayers.

The organization of the church consists in its government by bishops, each in charge of a special flock, with subordination one to another, and the dependence of all on the bishop of Rome (the pope), as shepherd of the whole fold of Christ. The Episcopal character is the same in all bishops, but governing authority, which is called jurisdiction, is possessed in various degrees—in its fulness, by the pope, who is the fountain, the streams of which flow to all others. He alone has apostolic authority, which may be everywhere exercised, with due regard to the local prelate, and which is suited to every emergency. Next to him, in governing authority, are the cardinals, in whom, during the vacancy of the Roman see, this plenitude of jurisdiction is believed to reside. Each bishop governs his own diocese, not as papal vicar, but as ordinary or proper ruler, although in some things his authority is enlarged as delegate apostolic. Several dioceses form a province which is governed by an archbishop. Many ecclesiastical provinces are sometimes united as a nation, under a primate who ranks above other prelates. The vicar apostolic is, in some sense, a missionary bishop. The general government of the church is carried on at Rome, where the pope is assisted by the body of cardinals, several of whom compose standing committees to examine and prepare the matters for final action. Nearly thirty belong to the College of Propaganda, which is charged with a general superintendence of missionary countries. The appointment of bishops is made on the recommendation of the local prelates, with the advice of the cardinals.

The religious orders in the church are like corporations in a civil government, having special exemptions and privileges to enable them successfully to pursue the objects of their respective institutes. They derive



METHODIST CAMP MEETING.

these from the pope, who, in virtue of his apostolical authority, exempts the members from the jurisdiction of the bishops in what regards their domestic discipline, but leaves them dependent on them for faculties to be exercised in behalf of the faithful. The older religious orders of Europe all have their houses here; the Benedictines, Dominicans, Franciscans, Carmelites, Augustinians, Lazarites, and the followers of Loyola, or, as they are often called, Jesuits. A new religious order, that of St. Paul the apostle, or as they are usually called, Paulites, was founded a few years since in New York, and has been very efficient in missionary labors. There are also teaching orders, like the Brothers of the Christian Schools, and charitable orders of both sexes, like the Sisters of Charity, Brothers and Sisters of the Sacred Heart of Jesus, Sisters of Mercy, Little Sisters of the Poor, &c., &c. These charitable orders have effected much good in the founding and management of schools, in visiting the sick and prisoners, in managing hospitals, reformatories, &c. Of late years, the Roman Catholics have not only largely increased their colleges, but have multiplied their schools, claiming that their children should be instructed in religious as well as in secular knowledge. They have also established many orphan asylums, reformatories, and Magdalen asylums.

II. BAPTISTS.

I. REGULAR BAPTISTS. The Baptist churches of the United States rank among the most numerous and influential of the evangelical religious denominations in the country, and while generally either moderate or strict, (but not high,) Calvinists in their theology, and strictly congregational in their church government, are distinguished from other denominations holding to Calvinistic doctrines and a congregational polity, by their views on the mode and subjects of *baptism*. They hold that immersion is the only true mode of baptism, and a personal profession of faith in Christ the necessary prerequisite for every subject of that ordinance.

It is usually stated that Roger Williams, the founder of the colony of Rhode Island, was also the founder of the Baptist denomination in the United States. The statement is but partially true. Four years before Williams's baptism, in 1635, Hansard Knol-

lys, an English or rather Welsh, Baptist preacher, had emigrated to New England with a portion of his flock and settled as a pastor at Dover, New Hampshire, and though he afterward returned to England, his church remained. Baptist sentiments were propagated in the Rhode Island colony, but much more by John Clarke, a friend and associate of Williams, than by Williams himself; indeed, the latter, whose memory is deserving of all honor for his noble defence and maintenance of complete liberty of conscience, held certain views in the latter part of his life, which caused him to stand aloof, so far as communion went, from the Baptist as well as from other churches. There were, however, a considerable number of Baptists who emigrated from England, Holland, and Germany within the next hundred and thirty years, and Baptist churches existed in most of the thirteen colonies at the commencement of the Revolution; yet their membership was small. In 1762 there were but 56 churches with less than 6,000 members in the denomination. In 1776 they reckoned nearly 150 churches with a membership of about 13,000. From the time of the revolution, their growth was very rapid, exceeded only by that of the Methodist churches.

Every church among the Baptists is completely independent of every other and fully competent to establish its own doctrinal views, its own course of polity and discipline, and to elect, license, and ordain its own officers whether they are deacons, licensed preachers, ordained ministers or pastors. The Baptists acknowledge no church courts, no hierarchy, presbytery, synod, directory, classis, general assembly, annual or general conference, dean or bishop as having any power over the *individual church*, which they regard as the final arbiter in all matters of discipline, polity, and doctrine. In these matters they are the most absolutely pure and simple congregationalists, the completest democracy in the world. They have, it is true, their associations and conventions, and their church councils, but these are only for devotional, charitable, and advisory purposes; they possess no disciplinary powers. It follows as a necessary corollary from this, that though all the Baptist churches acknowledge and receive "the Scriptures of the Old and New Testaments as their only and all sufficient rule of faith and practice" they have no articles of faith or creed which are universally received. Many of the oldest and

most influential churches have never had articles of faith. Where they are used, each church prepares its own or adopts one already prepared as it pleases, yet most of them agree in the principal points of doctrine. The Regular Baptists are in general Moderate Calvinists, accepting "for substance of doctrine" the view of the general sufficiency but particular application of the Atonement enunciated by Rev. Andrew Fuller, in his theological works. A confession of faith, embodying these doctrines and known as the New Hampshire Confession of Faith, was prepared more than forty years ago and has perhaps been adopted by more churches than any other; yet while it represents fairly the views of the great body of regular Baptists, it cannot be considered an authoritative document. We give below the articles of this confession.

I. *Of the Scriptures.* We believe that the Holy Bible was written by men divinely inspired, and is a perfect treasure of heavenly instruction, that it has God for its author, salvation for its end, and truth without any mixture of error for its matter; that it reveals the principles by which God will judge us; and therefore is, and shall remain to the end of the world, the true centre of Christian union, and the supreme standard by which all human conduct, creeds, and opinions should be tried.

II. *Of the True God.* We believe that there is one, and only one, living and true God, an infinite, intelligent Spirit, whose name is **JEHOVAH**, the Maker and Supreme Ruler of Heaven and Earth; inexpressibly glorious in holiness, and worthy of all possible honor, confidence, and love; that in the unity of the Godhead there are three persons, the Father, the Son, and the Holy Ghost; equal in every divine perfection, and executing distinct but harmonious offices in the great work of redemption.

III. *Of the Fall of Man.* We believe that Man was created in holiness, under the law of his Maker; but by voluntary transgression fell from that holy and happy state; in consequence of which all mankind are now sinners, not by constraint but choice, being by nature utterly void of that holiness required by the law of God, positively inclined to evil; and therefore under just condemnation to eternal ruin, without defence or excuse.

IV. *Of the Way of Salvation.* We believe that the salvation of sinners is wholly

of grace; through the Mediatorial offices of the Son of God; who by the appointment of the Father, freely took upon Him our nature, yet without sin; honored the Divine law by his personal obedience, and by his death made a full atonement for our sins; that having risen from the dead, He is now enthroned in Heaven, and uniting in His wonderful person the tenderest sympathies with divine perfections, He is every way qualified to be a suitable, a compassionate, and an all-sufficient Saviour.

V. *Of Justification.* We believe that the great Gospel blessing which Christ secures to such as believe in Him is Justification, that Justification includes the pardon of sin, and the promise of eternal life on principles of righteousness; that it is bestowed, not in consideration of any works of righteousness which we have done, but solely through faith in the Redeemer's blood, by virtue of which faith His perfect righteousness is freely imputed to us of God, that it brings us into a state of most blessed peace and favor with God, and secures every other blessing needful for time and eternity.

VI. *Of the Freeness of Salvation.* We believe that the blessings of salvation are made free to all by the Gospel; that it is the immediate duty of all to accept them by a cordial, penitent, and obedient faith; and that nothing prevents the salvation of the greatest sinner on earth, but his own inherent depravity and voluntary rejection of the Gospel, which rejection involves him in an aggravated condemnation.

VII. *Of Grace in Regeneration.* We believe that in order to be saved, sinners must be regenerated, or born again, that regeneration consists in giving a holy disposition to the mind; that it is effected in a manner above our comprehension by the power of the Holy Spirit, in connection with Divine truth, so as to secure our voluntary obedience to the Gospel; and that its proper evidence appears in the holy fruits of repentance, and faith, and newness of life.

VIII. *Of Repentance and Faith.* We believe that Repentance and Faith are sacred duties, and also inseparable graces, wrought in our souls by the regenerating Spirit of God, whereby being deeply convinced of our guilt, danger, and helplessness, and of the way of salvation by Christ, we turn to God with unfeigned contrition, confession, and supplication for mercy; at the same time heartily receiving the Lord Jesus

Christ as our Prophet, Priest, and King, and relying on Him alone as the only and all-sufficient Saviour.

IX. *Of God's Purpose of Grace.* We believe that Election is the eternal purpose of God, according to which He graciously regenerates, sanctifies, and saves sinners; that being perfectly consistent with the free agency of man, it comprehends all the means in connection with the end; that it is a most glorious display of God's sovereign goodness, being infinitely free, wise, holy, and unchangeable; that it utterly excludes boasting, and promotes humility, love, prayer, praise, trust in God, and active imitation of his free mercy, that it encourages the use of means in the highest degree; that it may be ascertained by its effects in all who truly believe the Gospel; that it is the foundation of Christian assurance, and that to ascertain it with regard to ourselves demands and deserves the utmost diligence.

X. *Of Sanctification.* We believe that Sanctification is the process by which, according to the will of God, we are made partakers of his holiness; that it is a progressive work; that it is begun in regeneration; and that it is carried on in the hearts of believers by the presence and power of the Holy Spirit, the Sealer and Comforter, in the continual use of the appointed means—especially, the word of God, self-examination, self-denial, watchfulness, and prayer.

XI. *Of the Perseverance of Saints.* We believe that such only are real believers as endure unto the end; that their persevering attachment to Christ is the grand mark which distinguishes them from superficial professors; that a special Providence watches over their welfare; and they are kept by the power of God through faith unto salvation.

XII. *Of the Harmony of the Law and Gospel.* We believe that the Law of God is the eternal and unchangeable rule of His moral government; that it is holy, just, and good; and that the inability which the Scriptures ascribe to fallen men to fulfil its precepts, arises entirely from their love of sin; to deliver them from which, and to restore them through a Mediator to unfeigned obedience to the holy Law, is one great end of the Gospel, and of the Means of Grace connected with the establishment of the visible church.

XIII. *Of a Gospel Church.* We believe that a visible church of Christ is a congregation of baptized believers, associated by covenant in the faith and fellowship of the Gos-

pel; observing the ordinances of Christ; governed by his laws; and exercising the gifts, rights, and privileges invested in them by His word; that its only scriptural officers are Bishops or Pastors, and Deacons, whose qualifications, claims, and duties are defined in the Epistles to Timothy and Titus.

XIV. *Of Baptism and the Lord's Supper.* We believe that Christian Baptism is the immersion in water of a believer, into the name of the Father, and Son, and Holy Ghost; to show forth in a solemn and beautiful emblem, our faith in the crucified, buried, and risen Saviour, with its effect, in our death to sin and resurrection to a new life; that it is pre-requisite to the privileges of a church relation; and to the Lord's Supper, in which the members of the church by the sacred use of bread and wine, are to commemorate together the dying love of Christ; preceded always by solemn self-examination.

XV. *Of the Christian Sabbath.* We believe that the first day of the week is the Lord's Day, or Christian Sabbath; and is to be kept sacred to religious purposes, by abstaining from all secular labor and sinful recreations, by the devout observance of all the means of grace, both private and public, and by preparation for that rest that remaineth for the people of God.

XVI. *Of Civil Government.* We believe that Civil Government is of Divine appointment, for the interests and good order of human society; and that magistrates are to be prayed for, conscientiously honored, and obeyed; except only in things opposed to the will of our Lord Jesus Christ, who is the only Lord of the conscience, and the Prince of the kings of the earth.

XVII. *Of the Righteous and the Wicked.* We believe that there is a radical and essential difference between the righteous and the wicked; that such only as through faith are justified in the name of the Lord Jesus, and sanctified by the Spirit of our God, are truly righteous in His esteem; while all such as continue in impenitence and unbelief are in His sight wicked, and under the curse; and this distinction holds among men both in and after death.

It is usual also in Baptist churches to have a Church Covenant, to which the members, when received, give their assent, as it is read by the pastor. This covenant pledges them to the duties of the Christian life, to the observance of the worship, ordinances,

discipline, and doctrines of the church, and to a strict avoidance of all temptations to evil, and of all habits which may bring dishonor or reproach upon their profession, and to live in harmony and peace and in christian fidelity with the members of the church. In case of discipline, the usual charge against the offender is the violation of his covenant vows. With rare exceptions the Baptist churches are associated; that is, the churches of each convenient district unite in an association of churches, varying in numbers from four or five to fifty or sixty. Each church is represented at the annual meetings of these associations by the pastor and a number of lay delegates. The functions of these associations are wholly advisory, except that sometimes there is formed from them a Society or Board for missionary work, which may or may not be incorporated, but which, while responsible to the association which created it, takes upon itself, with their sanction, the raising of the necessary monies for its work, and the management of that work in all its details. The Baptist churches have also in most of the states and territories, state conventions, composed in the smaller states of the pastor and two or three lay delegates from each church; in the larger states, of clerical and lay delegates appointed by the associations. These conventions are generally occupied with the domestic missionary work of the states, aiding feeble churches, establishing new ones, assisting in the cause of ministerial and denominational education, &c. In these bodies, as in the associations, the strictly democratic principle of having all power inhere in and proceed from the membership of the church is fully observed.

The Baptist denomination in the United States maintains general organizations for Foreign Missionary purposes, for Home Missions, Church Extension, and the education of Freedmen for the ministry; for the translation, publication, and circulation of the scriptures in our own country and in foreign lands; for the publication of tracts, sunday school, and denominational works; for the promotion of theological, collegiate, and academical education. and a consolidated American Baptist Missionary Convention for missionary and educational work, mainly among the freedmen.

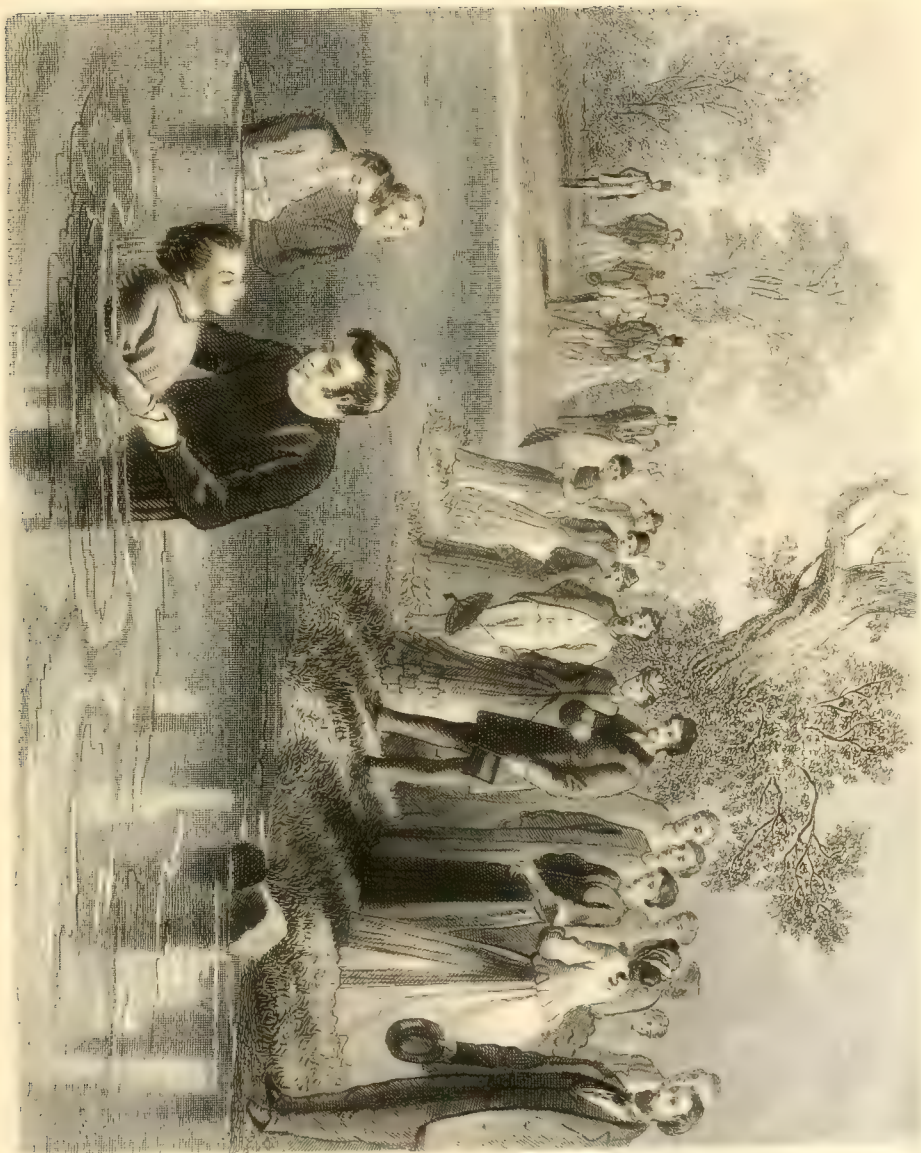
The ten societies of the denomination received in 1870 the following sums: for Foreign Missions, \$229,768.44; for Home Mis-

sions, Church Extension, &c., \$237,645.50; Bible, sunday school, and denominational publications and circulation, \$384,324.17 making a total of \$851,738.11 for missionary and educational purposes. The contributions for church purposes, and church extension, education, &c., not passing through these channels, the same year was about \$8,100,000 more.

The statistics of the denomination for 1870 were as follows: 799 associations, 17,745 churches, 10,818 ordained ministers; whole number of members 1,419,492, a net gain of 198,144 during the year. There were connected with these churches 5,251 Sunday Schools reported with 56,515 teachers, and 473,664 scholars. The number of volumes in the Sunday School libraries reported was 647,102, and the benevolent contributions of the schools \$122,143. There were the same year 38 colleges and theological seminaries belonging to the denominations, besides 18 or 20 others, mostly for female education, founded by Baptists and mainly under their control. These institutions had about 350 instructors and professors and over 6,000 students. The college property of these institutions is somewhat more than \$6,500,000.

They supported in 1870, 24 weekly, 3 semi-monthly, 12 monthly, and 3 quarterly periodicals devoted to the interests of the denomination, its Sunday Schools, and Mission enterprises.

II. FREEWILL BAPTISTS. This denomination originated in 1780, in which year Benjamin Randall, a native of Newcastle, N. H., born in 1749, and in 1771 converted under the preaching of George Whitfield, organized the first Freewill Baptist church, at New Durham, N. H. Randall was a man of but moderate education, but he possessed a strong and brilliant intellect, and having become convinced, in 1776, that the views of the Baptists were correct in regard to the mode and subjects of baptism, he joined them, and very soon after commenced preaching. He was a diligent student, and the Calvinistic doctrines of the Baptist churches being distasteful to him, he adopted after careful examination the views of Arminius, substantially as held by the New Connection of General Baptists in England, and the Methodists in this country. Mr. Randall preached these doctrines with great success, and in 1780 established his first church holding these doctrines. He also adopted the



principle of free or open communion. The growth of the denomination has been considerably rapid, though it has been, from their strong anti-slavery principles, confined entirely to the northern states, and its churches have been multiplied rather in the country than in the large cities. Almost two-thirds of its membership reside in New England and New York. Their views of doctrine correspond with the Regular Baptists on all points except the following, which we give from their Confession of Faith :

"The Atonement. As sin cannot be pardoned without a sacrifice, and the blood of beasts could never actually wash away sin, Christ gave himself a sacrifice for the sins of the world, and thus made salvation possible for all men. Through the redemption of Christ, man is placed on a second state of trial; this second state so far differing from the first that now men are naturally inclined to transgress the commands of God, and will not regain the image of God in holiness but through the atonement, by the operation of the Holy Spirit. All who die short of the age of accountability are rendered sure of eternal life. Through the provisions of the atonement, all are abilitated to repent of their sins, and yield to God; the Gospel call is to all, the Spirit enlightens all, and men are agents capable of choosing or refusing."

"Regeneration is an instantaneous renovation of the soul, by the Spirit of God, whereby the penitent sinner, believing in, and giving up all for Christ, receives new life, and becomes a child of God. This change is preceded by true conviction, repentance of, and penitent sorrow for sin; it is called in Scripture, "being born again," "born of the Spirit," "passing from death unto life." The soul is then justified with God."

"Sanctification is a setting apart the soul and body for holy service, an entire consecration of all our redeemed powers to God; believers are to strive for this with all diligence."

"Perseverance. As the regenerate are placed in a state of trial during life, their future obedience and final salvation are neither determined, nor certain; it is, however, their duty and privilege to be steadfast in the truth, to grow in grace, persevere in holiness, and make their election sure."

"Communion. Communion is a solemn partaking of bread and wine, in commemoration of the death and sufferings of Christ."

The custom or ordinance of "washing the

saints' feet," once practised to a considerable extent by this denomination, is still optional with them, but has generally been abandoned. In their church polity the Freewill Baptists are not so independent or democratic as the Regular Baptists, having adopted, with their doctrines, some of the views of the Methodists on church government. They have but two classes of officers in the church,—elders and deacons. Each church elects its own pastor, and exercises discipline over its own members; but as a church is accountable to the yearly meeting, which has, also, the power of receiving appeals and trying them. The ecclesiastical organizations of the denomination are the church, the quarterly meeting or conference, the annual meeting, and the general conference, which meets triennially. The quarterly conference consist of the ministers of its territory, and such lay members as the churches may select. A council from the quarterly conference organizes churches, and ordains ministers, and the ministers are accountable to it and not to their churches. The annual conferences are composed of delegates appointed by the quarterly conferences, and the general conference delegates are chosen from the annual conferences. The statistics of the denomination for 1870, are as follows; One general conference; thirty yearly meetings; 155 quarterly meetings; 1386 churches; 1145 ordained ministers, and 66,909 communicants. We have no report of their Sunday Schools, and no recent one of their benevolent contributions. Their donations to the foreign missionary cause in 1866, were \$12,166, but have since been considerably increased. They have also a Home Mission Society, and an Education Society. They have four colleges: Bates College, Lewiston, Me., which is liberally endowed, and has 12 instructors and 103 students; Hillsdale College, at Hillsdale, Mich.; West Virginia College, at Flemington, W. Va., and Ridgeville College, Ridgeville, Ind. They have also a Theological Seminary at New Hampton, N. H., and a Theological Department of Bates College, Me. There are also thirteen academies, seminaries, &c., and a society for the promotion of Education in the South. They have a printing establishment, the property of the denomination, at Dover, N. H., and issue a weekly paper, the "Morning Star," a monthly juvenile paper, and an annual, the "Freewill Baptist Register." The Free Communion Baptists or Free

Baptists, a separate denomination until 1841, united with them in that year; but the Freewill Baptist General Conference withdrew subsequently from 4000 of their own members in North Carolina, on the question of slavery, and refused to receive about 12,000 more from Kentucky, who applied, on the same grounds.

III. THE SEVENTH DAY BAPTISTS, differ from Regular Baptists only in the observance of the seventh, instead of the first day of the week for religious worship. Their first church in the United States was organized in 1671. They practice restricted communion, are Calvinistic in doctrine, and independent in church polity. They had in 1870, seventy-five churches, eighty-two ministers, and 7,336 members. They sustain missions in China and Palestine, and have a Home Missionary organization, an Education Society, and a tract and publishing house. They issue a weekly, a monthly, and a quarterly religious periodical. They have a flourishing college, Alfred University, at Alfred, Alleghany Co., N. Y., with 16 teachers and 364 students, and a good academy, the "De Ruyter Institute," at De Ruyter, Madison Co., N. Y. There are also a few churches of GERMAN SEVENTH DAY BAPTISTS, seceders from the Tunkers or German Baptists, in Franklin, Bedford, and York counties, Pa. They are inclined to monasticism, or the community life, and number but a few hundreds.

IV. THE SIX PRINCIPLE BAPTISTS are a small body, mostly confined to Rhode Island, but having a few congregations in Massachusetts, New York, and Pennsylvania. They are Arminian in doctrine. Their six principles are those stated in Hebrews, vi:1, 2. Their rite of "laying on of hands" is analogous to Episcopal confirmation, and is their principal distinguishing point. Their ministers are not generally well educated, and receive no stated support. They are generally opposed to missions and to most of the reforms of the day. The denomination originated in 1649, but has not grown rapidly. It now numbers about 20 churches, 18 ordained ministers, and 3,300 members. They have no periodical, and no schools or colleges.

THE OLD SCHOOL OR ANTI-MISSION BAPTISTS, are diminishing every year in numbers, but have their churches scattered through most of the states of the Union, except New England. They are generally

hyper-calvinistic or anti-nomians, in doctrine, and oppose strongly missions, Sunday schools, temperance societies, and all agencies not mentioned in the Scriptures. Their ministers are not generally educated, and seldom or never receive any salary. Fifty years ago the number of these churches was very large, but they have dwindled to a few hundreds, and their membership to perhaps, 45,000. They have no schools or colleges, but have several periodicals, one of them, "The Signs of the Times," being published semi-monthly, at Middletown, Orange Co., N. Y.

VI. THE DISCIPLES OF CHRIST, OR CHURCH OF CHRIST, or, as they are often called, though they do not acknowledge the name, CAMPBELLITES, are a body of Baptists, who owe their origin, as a distinct denomination, mainly to the labors of Thomas and Alexander Campbell, two Presbyterian clergymen, father and son, who settled in Western Pennsylvania, in 1808. They originally belonged to the "Seceders," one of the denominations which had come off from the Scottish Kirk. The first effort of Mr. Thomas Campbell, in which his son joined him very heartily, was to effect a union of the different Protestant denominations of that region, by an agreement to reject all creeds and confessions of faith, and take the Scriptures only as the rule of faith and practice, seeking to come at their meaning by earnest prayer, and careful study. A considerable number joining in this work, a small congregation was formed in Washington Co., Penn., known as the "Brush Run Church," Sept. 10, 1810. Of this church Thomas Campbell was the elder or pastor, and by it, his son, Alexander, was ordained to the ministry. Careful and prayerful study of the Bible for nearly two years, brought the Campbells and several of their followers to the conclusion that the Scriptures taught "the immersion of believers," and they with five others, were accordingly baptized in June, 1812, by a Baptist minister. Within the next three years, their adherents had increased to five or six considerable congregations, and they united with the Redstone Baptist Association, stipulating, however, in writing "that no terms of union or communion, other than the Holy Scriptures, should be required." Some difficulty arising in the Association in consequence of their measures, they withdrew and joined the Mahoning (Ohio) Association, which soon became

fully identified with the movement. In 1823 Alexander Campbell, a man of extensive scholarship, and remarkable logical and dialectic powers, commenced the publication of "The Christian Baptist." This periodical was edited with great ability, and through its very large circulation, aided by his extensive tours, and his public discussions with the leading men of different denominations, his peculiar views spread widely among the Baptists and other denominations, throughout the Middle and Northwestern States. Though acknowledging no creed or confession of faith, and making his motto "Faith in the Testimony of God, and obedience to the commandments of Christ, the only bond of union," Mr. Campbell did use a phraseology in the enunciation of his doctrines which was liable to perversion, and was, in fact, often perverted. He insisted that the Scriptures commended "baptism for the remission of sins," and as Peter replied in Acts, ii : 38, to those who asked what they should do: "Repent and be baptized, every one of you, in the name of Jesus Christ, for the remission of sins, and ye shall receive the gifts of the Holy Ghost," so he would have the Christian minister now baptize all who professed to be penitent, for the remission of their sins, and the assurance of pardon, and the gifts of the Holy Spirit. His own views were decided that penitence and faith were necessary to salvation, but that the assurance of this pardon and salvation was to be attained through submission to this initiatory rite. To many of the Baptist churches, it seemed that this was opening the door to a belief in baptismal regeneration, a doctrine abhorrent to them as to most Protestants, and in 1827 the excision of Mr. Campbell's followers commenced, and was carried on unsparingly for many years after. Their exclusion from the regular Baptist churches led to their forming churches and associations of their own, and their numbers were largely augmented by the accession of a body known as Reformers, who, by an independent process, had reached substantially the same conclusions with them. The "Disciples," owing to their somewhat peculiar and vague phraseology in avowing their faith, have been charged with Unitarianism, as well as some other heresies; but it is now very generally conceded that they are Trinitarians, and that they do not differ in the cardinal doctrines of the Bible from other Evangelical Christians. That their formula

on the subject of baptism has led some astray and prejudiced the minds of others, is probably true; but judged by the tests of Christian activity and evangelical labor, they are perhaps little, if at all, behind other denominations. Their only distinctive practice, aside from the baptismal formula, is the observance of the ordinance of the Lord's Supper weekly. They recognize three orders of church officers, viz: 1. Elders, presbyters, or bishops, terms which they regard as synonymous; 2. Deacons; 3. Evangelists. The last are their itinerant ministry or missionaries, and are supported by voluntary contributions. They are very earnest in their support of educational institutions, and of organizations for the distribution of the Scriptures. Their distinguished leader died in 1866, at the age of 77, after performing an amount of intellectual labor greater than falls to the lot of one educated man in a thousand. He had written largely on theological subjects, edited for more than forty years a very able religious periodical, conducted successfully five or six protracted public discussions, founded, and taught large classes in a college of good repute, and preached many thousand sermons.

The "Disciples" at the time of his death had 1,642 preachers (elders or bishops) a large number of evangelists, and 424,250 members. Their present number of preachers of both classes is estimated at about 3,000, their congregations at nearly 5,000, and their membership at about 512,000. The educational institutions, organized and supported by the "Disciples," are Kentucky University at Lexington, Ky.; Bethany College, Bethany, West Virginia; a College at Indianapolis, Ind.; Eureka College and Abingdon College, at Eureka and Abingdon, Ill.; Oskaloosa College, Iowa; Wilmington College, Wilmington, Ohio; Franklin College, near Nashville, Tenn.; Woodland College, California; Jeffersonstown and Eminence, Kentucky; female colleges at Columbia, Missouri, Versailles, and Harrodsburg, Ky., and Bloomington, Ill.; and 12 Academies and Seminaries. They have twenty-three periodicals, of which 9 are weekly, 13 monthly, and one quarterly. The "*Millennial Harbinger*," a monthly, succeeded the "*Christian Baptist*," Dr. Campbell's first periodical, and was edited by him till his death.

VII. THE CHRISTIAN CONNECTION, often but improperly called CHRIST-ians, are a body of religionists who claim a threefold

origin. In North Carolina, in 1793, a considerable number of churches seceded from the Methodist Episcopal Church under the leadership of Rev. J. O. Kelley, and others, and first took the name of Republican Methodists, but afterward making the Bible their sole standard of faith, and having become convinced of the necessity of immersion on the profession of faith, they adopted the name of "Christians." In 1800, Dr. Abner Jones, Elias Smith, and other members of a Baptist church in Hartland, Vermont, knowing nothing of the action of these North Carolina churches, separated from the church with which they were connected and organized a church at Lyndon, Vermont, on the principle of "making the Bible alone their confession of faith." This soon grew in numbers and other churches were constituted on the same principle. In 1801, after the great revival in Kentucky and Tennessee, which led to the organization of the Cumberland Presbyterian Church, Rev. B. W. Stone, and four other Presbyterian ministers of Kentucky, withdrew, and adopting soon after the name of "Christians," organized churches and formally proclaimed their principles in 1804. These three bodies originating in as many denominations, came together in a general convention two or three years later and became one body. They have two Quadrennial Conferences, the United States and the Southern. Their first weekly periodical, "*The Herald of Gospel Liberty*," was one of the first if not the first of the religious newspapers published in the United States, and is still maintained.

Admitting no creed or confession of faith, and allowing all its adherents to interpret the Scriptures for themselves, the Christian Connection necessarily allows a wide range of doctrinal belief and it is somewhat difficult to determine what are their doctrinal views. A considerable portion, especially in the Western and Central States, are not Trinitarians. They hold that there is one God, the God of the Bible; that Christ is a divine being, pre-existent, and the mediator between God and man; that Christ's sufferings and death atone for the sins of all men, who, by repentance and faith, may be saved. They believe immersion the only proper mode, and believers the only proper subjects of baptism. Communion at the Lord's table is open to believers of all denominations. In regard to church government and polity, each church is theoretically and practically

independent. They have annual State Conferences, composed of ministerial and lay delegates from the churches which receive and ordain pastors, but can pass no laws binding the several churches. Their General Convention or Conference has Missionary, Educational, Publishing, and Sabbath School departments, each of which are in a prosperous condition. They have a publishing establishment at Dayton, Ohio, from which are issued, the *Gospel Herald*, a weekly, the *Sunday School Herald*, a monthly periodical, a Quarterly Review, and a *Christian Register*, annually, and the books and tracts of the denomination. The "*Herald of Gospel Liberty*," now (1871) in its sixty-third year, is still published at Newburyport, Mass. There was also, previous to the war, a publishing establishment of the denomination at Suffolk, Va., and "*The Christian Sun*," the organ of the Southern churches, was published there. The printing establishment was destroyed and its funds lost during the war, but the paper, though discontinued for the time, was revived in 1867. There is great difficulty in ascertaining accurately the statistics of the "Christian Connection." At the West they are often confounded with "The Disciples," with whom many of them fraternize. They have about 70 Conferences, and it is estimated 3,000 ministers, 5,000 churches, and about 300,000 members. Their educational institutions are Antioch College, Ohio, which has been aided largely by the Unitarians, Union Christian College, Indiana, Le Grand Institute, Iowa, Wolfsborough Seminary, New Hampshire, and Starkey Seminary, New York. We can obtain no statistics of their Sabbath Schools.

VIII. THE MENNONITES, a denomination of Baptists, first known in Holland as the followers of Simonis Menno in the sixteenth century. They settled in and about Germantown, Penn., in 1683, and in Lancaster County, Penn., in 1709. They have since spread over a great portion of Pennsylvania, and have churches also in Maryland, Virginia, Ohio, Indiana, New York, and Canada. Their doctrines are, in general, similar to those of the regular Baptist churches, except that some of them admit the validity of sprinkling as baptism. They observe the ordinance of "Washing the Saints' feet," and forbid their members to marry any except those who are members of the church. They resemble the Friends in their aversion to

legal oaths, to war, and to capital punishment. They are divided into three parties, or sub-sects: the Old Mennonites, the Reformed Mennonites, who came off in 1811; and the Amish Church or Hooker Mennonites. All profess to agree to the standard or confession of faith adopted at Dort, Holland in 1632. The statistics of the denomination, as well as its history, are very imperfectly known. According to their journals they had, in 1859, 128,000 members in America; but later statistics (in 1869) which do not, however, include Canada, where they are considerably numerous, put their number in the United States at 60,000, with about 400 churches, and perhaps 450 ministers. In 1860, the eighth census reported their church edifices as having only sittings for 37,000, but these returns were so fallacious that little dependence could be placed upon them. The denomination are not apparently increasing with any great rapidity. They have one English, and two German newspapers, and a German and an English Almanac, all published at Elkhart, Ind., except one of the German papers, which is issued from Milford Square, Penna. There are no colleges, we believe, under their special care or patronage.

IX. BRETHREN, GERMAN BAPTISTS, TUNKERS OR DUNKERS. A small body of Baptists, who originated at Schwartzenu, Germany, in 1708, but were driven to America by persecution in 1719. They are found mostly in Pennsylvania, Ohio, and Virginia, Maryland, and Indiana. In doctrine they incline to Arminianism, believing in a general redemption, though in other doctrines, they refer to the confession of Dort, which is Calvinistic. They have been charged with believing in the final restoration of the wicked to heaven and happiness, but the doctrine is not a part of their public teaching, and is not perhaps generally held by them. They practice trine immersion, and in baptism incline the body forward instead of backward as other Baptists do. They also practice laying on of hands and prayer, while the person baptized is still in the water. The Lord's Supper is celebrated with its accompanying usages of love feasts, the washing of feet, the kiss of charity, and the right hand of fellowship. They also anoint the sick with oil for their recovery. In other matters they resemble the Friends, using great plainness of dress and speech, refusing to take legal oaths, and to engage in war.

They will not go to law, and generally will not take interest on money lent. They have bishops or ministers, elders or teachers, deacons, and deaconesses, the latter being aged women set apart for this special work. The ministers or bishops alone receive ordination. Until recently, questions were decided by lot instead of by voting. Their statistics in 1866 were 200 churches, 150 ministers or bishops, about 500 elders, and 20,000 members. They have recently established Sabbath Schools, though a branch of them, (the Seventh Day Dunkers,) maintained a Sunday School at Ephratah, Penn., from 1740 to 1770.

**X. CHURCH OF GOD OR WINEBRENNER-
RIANS,** a denomination of Baptists, organized in 1830, by Rev. John Winebrenner, formerly a minister of the German Reformed Church at Harrisburg, Pa., where he was settled in 1821. He was very successful in his pastorate, and great revivals took place in his congregations, but he was charged with deviating from the doctrines and practice of the German Reformed Church. In 1830 he withdrew from the church, and held a meeting with some other preachers, in which it was resolved that the only scriptural name for the one true Church was "The Church of God," and that they would henceforth belong to that church only. At the same time Mr. Winebrenner avowed the change of views to which he had been led, which was accepted by the others.

The doctrines then advanced are substantially those of "The Church of God" to-day. The general tone of her doctrines is thoroughly evangelical though inclined rather to the Arminian than the Calvinistic view. So far as baptism, in mode and subjects, is concerned they are in unison with the regular Baptists. Their peculiar views of doctrine and polity are thus expressed by themselves:—She ("The Church of God") believes in three positive ordinances of perpetual standing in the church, viz., Baptism, Feet-Washing, and the Lord's Supper.—She believes that the ordinance of feet-washing, that is, the literal washing of the saints' feet, according to the words and example of Christ, is obligatory on all Christians, and ought to be observed by all the churches of God.

She believes that the Lord's Supper should be often administered, and to be consistent, to Christians only, in a sitting posture and always in the evening.

She believes in the propriety and utility

of holding fast days, experience meetings, anxious meetings, camp meetings, and other special meetings of united and protracted efforts for the edification of the church, and the conversion of sinners.

She believes in the personal coming and reign of Jesus Christ. There are also articles in her confession of faith against the manufacture, traffic, and use of ardent spirits as a beverage, against slavery as impolitic, and unchristian, and against civil wars as unholy and sinful and that the saints of the Most High ought never to participate in them.

Her church government is somewhat peculiar. She claims to be independent and Congregational, yet each church has its council, composed of the preachers in charge, and the elders and deacons, which has all the powers of the session of a Presbyterian, or the consistory of a Reformed church.

She has also her annual Elderships, consisting of all the pastors, and an equal number of ruling elders within a given district, and her Triennial General Eldership, consisting of delegates from the Annual Elderships, who, if preachers, must have been at least five years in the ministry. This General Eldership owns and controls all the common property of the church. Her officers are ministers, who may be either stationed pastors, itinerants on circuits, or missionaries at large; ruling elders, and deacons. The church has a domestic and a foreign missionary society, and a printing establishment. They issue a weekly paper "*The Church Advocate*," a Sunday School paper, and a German weekly paper. They have two colleges, one at Centralia, Kansas, and another as yet only partly organized. Their numbers were estimated in 1870, at 400 churches, 350 ordained ministers, and 30,000 members. They are found mostly in Pennsylvania, Ohio, Indiana, Illinois, Iowa, Michigan, and Kansas.

IV. PRESBYTERIANS.

I. THE PRESBYTERIAN CHURCH IN THE U. S. AMERICA. (North.) This large and respectable body of Christians, trace their origin as a denomination in this country to the Scottish Kirk, or Established Church of Scotland, to which most of the early Presbyterians in this country had belonged previous to their emigration hither. The first

Presbyterian church in the Colonies is believed to have been the Rehoboth church in Maryland, organized in 1690; that on Elizabeth River, Virginia, was formed about the same time, and those of Freehold, and Woodbridge, N. J., not later than 1692. The first presbytery, (that of Philadelphia,) was formed in 1706, and a synod of four presbyteries in 1716. A division took place between the "Old Side" and the "New Side" or "New Lights," in the synod (the synod of Philadelphia) in 1741; the "Old side" insisting upon a thoroughly educated ministry, and the strict observance of Presbyterian order in accordance with the rules of the Scottish Kirk, while the "New Side" or "New Lights," who had been to some extent under the influence of Whitfield and his followers, required conclusive evidence of experimental religion in the candidates for the ministry, and a good, but not necessarily a collegiate education, and were less strenuous on the minutiae of Presbyterian order. This division continued for 17 years, when the two parties came together and the two synods were united under the name of the "Synod of New York, and Philadelphia." At the close of the Revolutionary war, there were about 170 Presbyterian ministers, and rather more than that number of churches, with an entire membership of less than 20,000. In 1788 a committee of the Synod had completed the revision of the standards of doctrine and polity of the church, and recommended its reorganization into four synods, and a General Assembly over the whole. This recommendation was adopted, and taking a new departure from the great revivals of 1800, 1801, and 1802, the church began to grow with considerable rapidity. In 1801 a "plan of Union" was arranged between the Presbyterians and Congregationalists in the new settlements to prevent disagreement between the two denominations, and to facilitate their coöperation in missionary enterprises. This continued 36 years. There had been evidently two parties in the Presbyterian church prior to 1830, but there had been no decided collision between them until about 1835, when some test cases led to a division, and the excision of four synods from the General Assembly in 1837. At this time the New School General Assembly was formed, and for thirty-three years there were two General Assemblies, both calling themselves the General Assembly of the Presbyterian Church in the United States of

America; both holding professedly to the same standards and alike in church polity as well as in doctrine. They were distinguished as the Old School and the New School General Assemblies. Each had their missionary, and publication organizations, though the New School body coöperated for many years with the American Board of Commissioners for Foreign Missions, and the American Home Mis-ionary Society. In 1870, after a discussion and balloting for nearly two years on the details, the two General Assemblies, with their entire constituency reunited, and now form one body. The Southern synods, the larger portion of them belonging to the Old School branch, seceded from the General Assembly, those heretofore belonging to the New School in 1857, and those of the Old School in 1861, and eventually coalesced in the General Assembly of the Presbyterian Church, south. Overtures have since been made to them for reunion with the now United church in the Northern states, but they have been thus far repelled.

The Presbyterian church recognizes and avows the necessity of doctrinal standars of faith, and adopts as its standard, The Westminster Assembly's Confession of Faith, and Exposition of doctrine, as contained in the shorter and larger catechisms of that body. We have not space to give the whole of these, but insert below, those which are distinctive in their character, giving only the answers to the questions of the shorter catechism, as these contain the declarative portion of the confession. It is hardly necessary to say that this confession is always in accordance with the principles, and often uses the very phraseology (translated) of Calvin in his celebrated Institutes, and is sustained by abundant references to scripture on each point.

“1. Man's chief end is to glorify God, and to enjoy Him forever.

2. The Word of God, which is contained in the Scriptures of the Old and New Testaments, is the only rule to direct us how we may glorify and enjoy him forever.

3. The Scriptures principally teach what man is to believe concerning God, and what duty God requires of man.

4. God is a spirit, infinite, eternal and unchangeable, in his being, wisdom, power, holiness, justice, goodness, and truth.

5. There is but one only, the living and true God.

6. There are three persons in the God-

head, the Father, the Son, and the Holy Ghost, and these three are one God, the same in substance, equal in power and glory.

7. The decrees of God are his eternal purpose, according to the counsel of his will, whereby for his own glory, he hath fore-ordained whatsoever comes to pass.

8. God executes his decrees in the works of creation and providence.

9. The work of creation is, God's making all things of nothing, by the word of his power, in the space of six days, and all very good.

10. God created man, male and female, after his own image, in knowledge, righteousness, and holiness, with dominion over his creatures.

11. God's works of providence are, his most holy, wise, and powerful preserving and governing all his creatures, and all their actions.

12. When God had created man, he entered into a covenant of life with him, upon condition of perfect obedience; forbidding him to eat of the tree of knowledge of good and evil, upon the pain of death.

13. Our first parents being left to the freedom of their own will, fell from the estate in which they were created, by sinning against God.

14. Sin is any want of conformity unto, or transgression of, the law of God.

15. The sin whereby our first parents fell from the estate wherein they were created was their eating the forbidden fruit.

16. The covenant being made with Adam, not only for himself, but for his posterity; all mankind descending from him by ordinary generation, sinned in him, and fell with him, in his first transgression.

17. The fall brought mankind into an estate of sin and misery.

18. The sinfulness of that estate whereinto man fell, consists in the guilt of Adam's first sin, the want of original righteousness, and the corruption of his whole nature, which is commonly called original sin, together with all actual transgressions which proceed from it.

19. All mankind by their fall lost communion with God, are under his wrath and curse, and so made liable to all the miseries of this life, to death itself, and to the pains of hell forever.

20. God having out of his mere good pleasure, from all eternity, elected some to everlasting life, did enter into a covenant of

grace to deliver them out of the estate of sin and misery, and to bring them into an estate of salvation by a Redeemer.

21. The only Redeemer of God's elect is the Lord Jesus Christ, who, being the Eternal Son of God, became man, and so was and continues to be God and man, in two distinct natures and one person, forever.

22. Christ, the Son of God, became man, by taking to himself a true body and a reasonable soul, being conceived by the power of the Holy Ghost, in the womb of the Virgin Mary, and born of her, yet without sin.

23. Christ, as our Redeemer, executes the offices of a prophet, of a priest, and of a king, both in his estate of humiliation and exaltation.

24. He executes the office of a Prophet in revealing to us, by his Word and Spirit, the will of God for our salvation.

25. He executes the office of a Priest, in his once offering up himself a sacrifice, to satisfy divine justice, and reconcile us to God; and in making continual intercession for us.

26. He executes the office of a King, in subduing us to himself, in ruling and defending us, and in restraining and conquering all his and our enemies.

27. Christ's humiliation consisted in his being born, and that in a low condition, made under the law, undergoing the miseries of this life, the wrath of God, and the accursed death of the cross; in being buried, and continuing under the power of death for a time.

28. His exaltation consists in his rising again from the dead on the third day, in his ascending up into Heaven, in his sitting on the right hand of God the Father, and in his coming to judge the world at the last day.

29. We are made partakers of the redemption purchased by Christ, by the effectual application of it to us by his Holy Spirit.

30. The Spirit applies to us the redemption purchased by Christ, by working faith in us, and thereby uniting us to Christ, in our effectual calling.

31. Effectual calling is the work of God's Spirit, whereby convincing us of our sin and misery, enlightening our minds in the knowledge of Christ, and renewing our wills, he doth persuade and enable us to embrace Jesus Christ, freely offered to us in the gospel.

32. They that are effectually called, do, in this life, partake of justification, adoption, sanctification, and the several benefits, which,

in this life, do either accompany or flow from them.

33. Justification is an act of God's free grace, wherein he pardons all our sins, and accepts us as righteous in his sight, only for the righteousness of Christ, imputed to us, and received by faith alone.

34. Adoption is an act of God's free grace, whereby we are received into the number, and have a right to all the privileges of, the sons of God.

35. Sanctification is the work of God's free grace, whereby we are renewed in the whole man, after the image of God, and are enabled more and more to die unto sin, and live unto righteousness.

36. The benefits which, in this life, do accompany or flow from justification, adoption and sanctification, are, assurance of God's love, peace of conscience, joy in the Holy Ghost, increase of grace, and perseverance therein to the end.

37. The souls of believers are, at their death, made perfect in holiness, and do immediately pass into glory; and their bodies being still united to Christ, do rest in their graves till the resurrection.

38. At the resurrection, believers being raised up in glory, shall be openly acknowledged and acquitted in the day of judgment, and made perfectly blessed in the full enjoyment of God to all eternity.

39. The duty which God requires of man is obedience to his revealed will.

40. The rule which God at first revealed to man for his obedience, was the moral law.

41. The moral law is summarily comprehended in the ten commandments.

42. The sum of the ten commandments is, to love the Lord our God, with all our heart, with all our soul, with all our strength, and with all our mind; and our neighbor as ourselves."

(Then follow in the Catechism, forty questions and answers, comprising the words of the ten commandments and expositions of their teaching, not necessary to be inserted here, and the Catechism then proceeds with answer.)

"82. No mere man, since the fall, is able, in this life, perfectly to keep the commandments of God, but doth daily break them, in thought, word, and deed.

83. All transgressions of the law are not equally heinous, some sins in themselves, and by reason of several aggravations,

being more heinous in the sight of God than oth rs.

84. Every sin deserves God's wrath and curse, both in this life, and that which is to come.

85. To escape the wrath and curse of God, due to us for sin, God requireth of us faith in Jesus Christ, repentance unto life, with the diligent use of all the outward means whereby Christ communicateth to us the benefits of redemption.

86. Faith in Jesus Christ is a saving grace, whereby we receive and rest upon him alone for salvation, as he is offered to us in the gospel.

87. Repentance unto life is a saving grace whereby a sinner, out of a true sense of his sin, and apprehension of the mercy of God in Christ, doth with grief and hatred of his sin turn from it unto God, with full purpose of, and endeavor after, new obedience.

88. The outward and ordinary means whereby Christ communicateth to us the benefits of redemption, are his ordinances, especially the word, sacraments, and prayer; all which are made effectual to the elect for salvation.

89. The Spirit of God maketh the reading, but especially the preaching of the word, an effectual means of convincing and converting sinners, and of building them up in holiness and comfort, through faith, unto salvation.

90. That the word may become effectual to salvation, we must attend thereunto with diligence, preparation, and prayer; receive it with faith and love; lay it up in our hearts, and practise it in our lives.

91. The sacraments become effectual means of salvation, not from any virtue in them, or in him that doth administer them; but only by the blessing of Christ, and the working of His Spirit, in them that by faith receive them.

92. A sacrament is a holy ordinance instituted by Christ wherein by sensible signs, Christ and the benefits of the new covenant are represented, sealed, and applied to believers.

93. The sacraments of the New Testament are Baptism and the Lord's Supper.

94. Baptism is a sacrament wherein the washing with water, in the name of the Father, and of the Son, and of the Holy Ghost, doth signify and seal our engrafting into Christ, and partaking of the covenant of grace, and our engagement to be the Lord's.

95. Baptism is not to be administered to any that are out of the visible church till they profess their faith in Christ and obedience to him; but the infants of such as are members of the visible church are to be baptized.

96. The Lord's Supper is a sacrament wherein by giving and receiving bread and wine, according to Christ's appointment, his death is showed forth; and the worthy receivers are, not after a corporeal and carnal manner, but by faith, made partakers of his body and blood, with all his benefits, to their spiritual nourishment and growth in grace.

97. It is required of them that would worthily partake of the Lord's Supper, that they examine themselves of their knowledge to discern the Lord's body, of their faith to feed upon him, of their repentance, love and new obedience, lest, coming unworthily, they eat and drink judgment to themselves.

98. Prayer is an offering up of our desires to God for things agreeable to his will, in the name of Christ, with confession of our sins, and thankful acknowledgment of his mercies.

99. The whole word of God is of use to direct us in prayer, but the special rule of direction is that form of prayer which Christ taught his disciples, commonly called the *Lord's Prayer*.

100. The preface of the Lord's Prayer (*Our Father which art in Heaven*) teacheth us to draw near to God with all holy reverence and confidence, as children to a Father, able and ready to help us; and that we should pray with and for others.

101. In the first petition (*Hallowed be thy name*), we pray that God would enable us, and others, to glorify him in all that whereby he maketh himself known, and that he would dispose all things to his own glory.

102. In the second petition (*Thy kingdom come*), we pray that Satan's kingdom may be destroyed, and that the kingdom of grace may be advanced, ourselves and others brought into it, and kept in it, and that the kingdom of glory may be hastened.

103. In the third petition (*Thy will be done on earth as it is in Heaven*), we pray, that God, by his grace, would make us both able and willing to know, obey, and submit to his will in all things, as the angels do in Heaven.

104. In the fourth petition (*Give us this day our daily bread*), we pray that of God's free gift, we may receive a competent portion of the good things of this life, and enjoy his blessing with them.

105. In the fifth petition (*Forgive us our debts, as we forgive our debtors*), we pray, that God, for Christ's sake, would freely pardon our sins; which we are the rather encouraged to ask, because by his grace, we are enabled from the heart to forgive others.

106. In the sixth petition (*And lead us not into temptation, but deliver us from evil*), we pray that God would either keep us from being tempted to sin, or support and deliver us when we are tempted.

107. The conclusion of the Lord's Prayer (*For thine is the kingdom, and the power and the glory, forever, Amen.*) teacheth us to take our encouragement to prayer from God only, and in our prayers to praise Him, ascribing kingdom, power, and glory to Him. And in testimony of our desire and assurance to be heard, we say, AMEN.

It will be seen from the 95th article, that the Presbyterian Church, as well as some of the denominations which follow in this volume, is *Pædo-baptist* or holds to the doctrine of infant baptism, in distinction from the churches of the Baptist group which administer baptism only to believers. It also differs from all the churches which we have previously described, in its church government and polity. The Presbyterian form of church government characterizes (under somewhat different names, but with the same meaning) all the churches which are affiliated with the Presbyterian, and it may therefore be described here once for all. Their government is representative rather than democratic. They recognize two classes of elders (presbyters); the teaching elder or minister of the word, and the ruling elder, a representative of the people, and their agent and ruler in matters pertaining to the church. While they have but one teaching elder or preacher, generally a pastor, to the church, they have two, four, or more, ruling elders, who, with the teaching elder and deacons, constitute the church session, which governs the church in all matters of doctrine and discipline, and being elected for that purpose also, has charge of the temporalities of the church. The church court next above the church, and, in ordinary cases, the leading judicatory, is the presbytery, composed of the teaching elders or preachers, and one ruling elder in each church within its bounds. The ordaining, recognition, and dismissal of pastors are conducted by the presbytery, on the application of the minister and the church

with which he is, or is to be, officially connected. (It is noteworthy that very often the minister is not a member of the church to which he ministers.) Difficult cases of discipline, or those in which there are two parties in a church, come before the presbytery for adjudication; and all charges of heresy, or misconduct against any of its ministers, is brought before it for trial and investigation. Above the presbytery in the gradation of church courts, is the synod, composed of a certain number of presbyteries, and when in session consisting of delegates from each presbytery, lay and clerical. It is a court of appeal from the presbytery, and its wider range of territory and larger number of able ministers and elders gives it some advantages. The final court of resort in all church matters is, however, the General Assembly or General Synod, composed of commissioners, clerical and lay, from the Synods. This General Assembly possesses entire control over the church action, the doctrinal soundness, and the educational and benevolent institutions of the denomination, and is, in its assembled capacity, the embodiment of the Presbyterian Church in America, or of the other organizations which it represents. Its sessions are annual, and usually continue for two or three weeks, and sometimes even longer. The Presbyterian Churches seem to have for their specialty the discussion of the doctrines of their confession of faith, and the detection of any and every form of heresy. Months and years of their history have been devoted to these discussions, and, while these are certainly important, there is danger that in these dialectic struggles their strength will be so far expended that they will hardly keep pace with the other denominations in growth and progress. Still they are one of the strongest and most efficient of the evangelical denominations in the United States, and are likely to do more efficient work in the future than they have in the past. They have shown a most commendable liberality recently. During the year ending in May, 1871, the new reunited Presbyterian Church had contributed to a memorial fund for building and paying the debts on church edifices, endowing colleges and theological seminaries, planting new missions, etc., etc., the magnificent sum of \$8,600,000, aside from their regular contributions to missionary, publication, educational, and other objects, and the

expenditure for current church expenses, salaries, etc., which amounted to about \$8,000,-000 more.

The statistics of the "Presbyterian Church in the U. S. A.," for 1870, were as follows:

There were 51 synods; 259 presbyteries; 4,238 ordained ministers; 338 licentiates and 541 candidates for licensure; 4,526 churches; 446,561 communicants; 32,003 were added on examination, and 21,447 on certificate; 10,122 adults and 16,476 infants baptized; 448,857 members of the Sabbath Schools. The benevolent contributions (not including any part of the memorial fund mentioned above) \$8,440,121. The net gain in the number of communicants in the year 1870-1 was 8,817, and the whole number of members reported May, 1871, 455,378.

II. PRESBYTERIAN CHURCH, IN THE UNITED STATES (South) —This body is composed of the seceders, who came off from the New School Presbyterian Church in 1857, and who joined the Southern General Assembly in 1863, and the seceders from the Old School Presbyterian Church, who left it in 1861, and immediately formed the Southern General Assembly. The secession, in both instances, was based mainly on the position of the two Northern General Assemblies on the question of Slavery, and in the latter case also because that in the war then just commenced, the Old School General Assembly avowed its loyalty and adherence to the Union. During the war there were hasty, and, perhaps, injudicious resolutions passed on both sides, and to the overtures which have since been made by the re-united Presbyterian Church for their return, the Southern General Assembly has replied "that they do not approve of a union with the Northern Church because it is a total surrender of all fundamental doctrines, and embraces all shades of belief." "The Southern Church," they say, "is the only surviving heir of true, unfailing testimonies, and there are impassable barriers to official intercourse between the two churches."

Their doctrinal standards, and their church government and polity, are identical with that of the Northern church.

Their statistics in 1870 were as follows: There were 11 synods, 55 presbyteries, 840 ordained ministers, 52 licentiates, and 161 candidates, for licensure; 1,469 churches, 82,014 members reported (206 churches did not report the number of members); 5,048 members added on examination, and 2,851

on certificate; 1,529 adults, and 3,555 children baptized; 47,317 Sunday School scholars, \$872,335 contributed to benevolent objects and church expenses.

III. UNITED PRESBYTERIAN CHURCH OF NORTH AMERICA. The body bearing this name in the United States is entirely different in its origin from the United Presbyterian Church of Scotland and Canada, though holding nearly the same views of doctrine and polity. The Scottish United Presbyterian Church is composed of the United Secession Church (itself a coalition of the Burgher and Anti-Burgher Synods) and the Relief church, both secessions from the established Kirk of Scotland on the ground of its corruption in doctrine and practice, and its enforcement of the settlement of ministers named by the heritors or aristocracy, against the will of the people. These two organizations came together and formed the Scottish United Presbyterian Church (which has a large and efficient branch in Canada) in 1847. The United Presbyterian Church, in the United States, was constituted in 1858 by the union of the Associate Reformed, and the Associate Presbyterian churches. Of these two bodies, the former was an agglomeration of small bodies of Covenanters, Associates, Reformed, and Burgher Presbyterians, which came together in 1782 and formed a synod composed of three presbyteries at Philadelphia. In 1803 they had increased so as to form four provincial synods, New York, Pennsylvania, Scioto, and the Carolinas, under one representative general synod. Two of these provincial synods (Scioto and the Carolinas) afterward became independent. The "Associate Presbyterian Church" had a somewhat similar history though it retained its allegiance to the Scottish synod of the church of the same name until 1818. It had had several small secessions from its ranks, which have since formed small presbyterian bodies. At the time of the union of these two churches in the United Presbyterian Church, in 1858, a few churches and ministers protested against the union, and have since connected themselves with some of the smaller organizations. The United Presbyterian Church has two colleges, two academies and theological seminaries at Alleghany, Penn., Xenia, Ohio, Monmouth, Illinois, and Newburgh, New York. Its statistics in 1870 were: 8 synods, 56 presbyteries, 553 ordained ministers, 43 licentiates, 55 students for the ministry, 729

congregations, 69,807 members, of whom 4,182 were received on profession, and 3,935 on certificate; 609 Sabbath Schools were reported with 6,761 officers and teachers, and 42,907 scholars. The total contributions to benevolent and church purposes were \$827,126. The denomination have 5 foreign missions, 19 foreign mission stations, 12 mission churches, 26 missionaries and helpers, and contributed, in 1870, \$63,500 for foreign missionary purposes. They have also successful Home Mission and Freedmen's Mission Boards, and expended on them \$49,481, in 1870. The net increase of members in 1870, over the previous year, was 4,183, but the number of ministers had decreased by 12. The contributions were about \$43,300 more than the previous year.

IV. GENERAL SYNOD OF THE REFORMED PRESBYTERIAN CHURCH. This body in its present organization, originated in 1782 from the ministers of the Reformed Presbyterian church who refused to consent to the union with the Associate Church and maintained their original organization. These were subsequently strengthened by the arrival of several ministers of the Reformed Presbyterian Church of Scotland in 1793, and subsequently. They were organized into a synod of three presbyteries in 1808, and in 1825 constituted a general synod. Their doctrines are those of the Westminster Assembly's Confession of Faith and Catechisms, with the addition of the Declaration and Testimony, in which they express their hostility to the interference of civil government with the affairs of the church, and their unwillingness to be bound by it in matters of conscience. On this point there has been a division among them, and a secession has resulted. The Reformed Presbyterian Church are the lineal and spiritual successors of the Covenanters or Cameronians, and like them have protested earnestly and steadily against a State church and the interference of the State with their ministry and their religious privileges. Even in the last century they were persecuted for these views in Scotland, and it was natural that they should adhere to them with the greater tenacity, but in this country where the State did not interfere with religious worship, and there was no established church, many of the ministers of the Reformed Presbyterian Church felt that there was no necessity for maintaining that hostility or non-intercourse with the civil government which, under the circumstances,

in Scotland, was right and proper; and they accordingly participated, as citizens, in voting and in such civil duties as they deemed right, while protesting against all interference of the civil power in matters of conscience. They, like all the Reformed Presbyterians, were strongly opposed to slavery, and would have no communion with slaveholders or those who defended slavery. A part of their ministers, whose feelings on the subjects of the civil power were intense, and who regarded our national constitution and government as infidel and Godless, withdrew from the General Synod on these grounds in 1833 and formed a separate organization which is now somewhat more numerous than the General Synod. All the Reformed Presbyterians refuse to use any other than inspired hymns and psalms in their worship, and for the want of any more literal metrical translation of the Psalms of David sing from Rouse's version of the Psalms, which, though rough and often uncouth in its translation, has the merit of following very closely the inspired original. The number of ministers of the General Synod in 1870 was 31, of churches 43, and of members about 4,000.

V. THE SYNOD OF THE REFORMED PRESBYTERIAN CHURCH, referred to above, which seceded in 1833, is now much larger than the General Synod, having, in 1870, 87 churches, 86 ministers, 8,577 members, received 435 by profession and 288 by certificate, and expended for benevolent purposes and church expenses about \$144,000.

VI. THE ASSOCIATE REFORMED SYNOD OF THE SOUTH, is the original Associate Reformed Synod of the Carolinas, which, in 1821, became an independent synod and refusing to follow the other associate reformed churches in their union with the Associate Presbyterians to form the United Presbyterian church, has existed as a distinct body. It is small in numbers. It does not differ in doctrine from the Associate Reformed Church or the Reformed Presbyterians, except on the subject of slavery, which it tolerated in its membership. Its growth was very slight for some years, but from 1842 to 1852 it increased quite rapidly; since 1863 there has been a decided falling off; twenty-six of its ministers, and some of the churches, having joined other Presbyterian bodies. In 1870, its statistics were: ordained ministers, 57; probationers, 7; theological students, 6; churches, 66; members, about 6,500. They have a small theological school at Due West,

S. C., and the organ of the church, *The Associate Reformed Presbyterian*, is published at the same place.

VII. THE CUMBERLAND PRESBYTERIAN CHURCH. This body is Presbyterian in its church government and polity but differs from the other Presbyterian churches in its doctrines. It had its origin in the great revival in Kentucky and Tennessee in 1799 to 1803. That revival was mostly among a people nominally attached to the Presbyterian Church, and in the camp meetings which the scattered population rendered necessary, there was a pressing demand for a greater number of ordained ministers to preach and to administer the ordinances. Under this demand some of the members of the newly organized Cumberland Presbytery, felt that it would be desirable to select men of piety, promise, and a fair education, from the laity, and license and ordain them for the work of the ministry. This was accordingly done in a few instances with good results. The Synod of Kentucky, however, regarded this proceeding as irregular and passed a resolution requiring the presbytery to present them for examination to a commission of the synod, and directing the young men to appear. Both the presbytery and the young men refused to submit to this examination, and the Synod, in 1805, in consequence prohibited them from exercising the functions of the ministry. The proscribed ministers, however, continued in the exercise of their ministerial duties, and after in vain appealing to the Synod for a repeal of their action, there was organized, in 1810, in Dickson County, Tennessee, a Cumberland Presbytery entirely independent of the Synod, and of the Presbyterian Church. The special difference between them and the Kentucky Synod is thus set forth in the record of their constitution: "All candidates for the ministry who may hereafter be licensed by this presbytery, and all the licentiates or probationers who may hereafter be ordained by this presbytery, shall be required before such licensure and ordination, to receive and accept the Confession of Faith and Discipline of the Presbyterian Church, except the idea of fatality that seems to be taught under the mysterious doctrine of predestination. It is to be understood, however, that such as can clearly receive the Confession of Faith without an exception, will not be required to make any. Moreover, all licentiates, before they are set apart to the

whole work of the ministry, or ordained, shall be required to undergo an examination in English grammar, geography, astronomy, natural and moral philosophy, and church history. It will not be understood that examinations in experimental religion and theology will be omitted. The presbytery may also require an examination on any part or all of the above branches of knowledge before licensure, if they deem it expedient."

The growth of this new organization was rapid; in 1813 they had three large presbyteries, and a synod was formed in October of that year. A committee was appointed immediately by this Synod to prepare a Confession of Faith, Catechism, and form of Church Government. These, when reported, were adopted at a subsequent session, and remain unchanged to the present time. As would be inferred from the constitution of the Presbytery just quoted, their doctrines are less strongly Calvinistic than those of the Presbyterians generally. Rev. Dr. Beard, formerly President of Cumberland College, Princeton, Ky., thus summarizes their doctrines: "That the Scriptures are the only infallible rule of faith and practice; that God is an infinite, eternal, and unchangeable Spirit, existing mysteriously in three persons, the three being equal in power and glory; that God is the creator and preserver of all things; that the decrees of God extend only to what is for His glory; that He has not decreed the existence of sin, because it is neither for His glory nor for the good of His creatures; that man was created upright in the image of God; but that, by the transgression of the federal head, he has become totally depraved, so much so that he can do no good thing without the aid of divine grace. That Jesus Christ is the mediator between God and man; and that he is both God and man in one person; that he obeyed the law perfectly, and died on the cross to make satisfaction for sin; and that in the expressive language of the apostle, *He tasted death for every man*. That the Holy Spirit is the efficient agent in our conviction, regeneration, and sanctification; that repentance and faith are necessary in order to acceptance, and that both are inseparable from a change of heart; that justification is by faith alone; that sanctification is a progressive work and not completed till death; that those who believe in Christ, and are regenerated by His spirit will never fall away and

be lost; that there will be a general resurrection and judgment; and that the righteous will be received to everlasting happiness, and the wicked consigned to everlasting misery."

The church polity of the Cumberland Presbyterian church does not differ from that of the Presbyterian church; it has its teaching and ruling elders, its sessions, presbyteries, synods, and since 1829 a General Assembly; but as a matter of convenience, they have adopted the itinerant system of the Methodists, and have many of their churches arranged in circuits. They practice infant baptism, and in the baptism of adults, immerse, sprinkle, or pour as the candidate prefers. They have a university, and two colleges, two theological seminaries, and a number of academies of high grade. Their Board of Publication has a small capital, about \$7,000, but is very efficient. They publish three or four periodicals. Their statistics in 1870 were estimated by their own organs as follows: 25 synods, 100 presbyteries, 1674 ordained ministers, 280 licentiates, 320 candidates for the ministry, about 2,000 churches, and over 80,000 members. Nearly 10,000 communicants were added to the church in 1870.

VIII. THE REFORMED (LATE DUTCH) CHURCH. This is the oldest, though by no means the largest of the Protestant churches in the United States, being an offshoot of the Reformed Church of Holland, and first planted in New Amsterdam, now New York City, in 1614, though no church was fully organized before 1628. Its growth was slow for 150 years, being confined almost exclusively to the Dutch speaking portion of the citizens, and its pulpit exercises being entirely in Dutch until near the commencement of the present century. It was dependent upon the church in Holland for the education and ordination of its ministry until 1771, when through the efforts of Rev. Dr. Livingston, the Classis of Amsterdam, with which all the churches here were connected, recommended them to organize as an independent church and make provision for the education of their ministry. Queen's (afterward Rutgers's) College, at New Brunswick, was founded about 1770, and a professorship of theology (at first separate from the college) established in New York, with Dr. Livingston as professor, in 1784. After the general substitution of English for Dutch in the preaching of its ministers, the church began

to grow and has maintained a prominent position in New York, New Jersey, and Eastern Pennsylvania, where alone they have any considerable membership. They have outside of these states 52 churches, mostly in Michigan, Illinois, and Wisconsin, and fifteen on missionary ground in India.

The doctrines of the Reformed church, as laid down in the Belgic confession, the Heidelberg catechism, and the Canons of the synod of Dort, do not vary in any important point from those of the Westminster confession of faith and catechisms, and are properly reckoned among the Calvinistic confessions of faith. The polity of the church is also Presbyterian, though with different names for the same things. The *Consistory*, which answers to the church session in the Presbyterian church, is composed of the dominie or pastor, the elders, and the deacons. The elders are chosen for two years, and after an interval of a year may be again elected. The classis answers to the presbytery, and the particular synods to the synods of the Presbyterian church, while they have a General Synod instead of a General Assembly. They are active in their missionary enterprises, having missions in Amoy, China, and its vicinity, and in Arcot, India. Until 1857 they were connected in these missionary enterprises with the American Board of Commissioners for Foreign Missions, but in that year they withdrew amicably and have since conducted them successfully alone, and have added a mission in Japan. They have an old and flourishing college (Rutger's) at New Brunswick, and a Theological seminary at the same place. They have a publishing establishment which issues four periodicals, and the denominational Psalmody and other books.

Their statistics for 1870 were, one General Synod, eight particular synods, 33 classes, 464 churches, 493 ministers, and 5 candidates, 38,552 families, 61,444 members, 3421 infants and 974 adults baptized, 3,628 received on confession, and 2,294 by certificate, 48,411 Sunday School scholars. Benevolent contributions, \$1,187,681.63, including those for congregational purposes. In 1868 the different classes voted to drop the word **DUTCH** from their title, and be henceforth known as **THE REFORMED CHURCH**.

IX. THE TRUE REFORMED DUTCH CHURCH. In 1822 Rev. Solomon Froeligh, D. D., of Hackensack, and a few other ministers seceded, with their congregations, from

the Reformed (Dutch) Church on the alleged ground of the prevailing laxness in doctrine and discipline, and organized a church with the above title. It has made very little progress, but had in 1862 less than 20 congregations, and about 1500 members.

X. THE REFORMED CHURCH IN THE UNITED STATES. (late GERMAN). This, the last though by no means the least of the American churches which conform to the Presbyterian polity though they do not bear the Presbyterian name, is a descendant, though with some modifications of doctrine, of the Reformed churches of Holland, Germany, France, and Switzerland. Rev. Dr. E. V. Gerhart, the President of its General Synod, and its principal historiographer, states that the first members of the Reformed Church of Germany, who came to the United States in any considerable numbers, were a body of Palatines, who tempted by William Penn's offer of lands, migrated to Pennsylvania and the adjacent colonies, in the early part of the eighteenth century, and many of whom settled east of the Susquehanna. It was among a colony of about 400 of these Palatines who settled in Montgomery county, Penn., about 1727, that Rev. Michael Weiss, one of their number, organized the first German Reformed Church. In the twenty years which followed, they were without ministers, teachers, or church organizations except this parent church, and though they had nearly thirty thousand of their people, mostly speaking German only, within a moderate circuit, they were like sheep without a shepherd. Rev. Michael Schlatter, a German Reformed minister from St. Gall, Switzerland, came over in 1746 as a missionary from the synods of North and South Holland, to look after their welfare. A man of great energy, skill, and judgment, he succeeded, after a time, in evoking order from this chaos. He organized churches, administered the sacraments, located pastors, established schools, and at the end of a year and a half, in September, 1747, was able to form the first synod or coetus of the German Reformed Church, consisting of five ministers, and twenty-six elders, who represented forty-six churches, and a population of thirty thousand. He then returned to Europe and succeeded in creating a large fund, the interest of which was devoted to sustaining ministers and school teachers among these people, and brought back with him to America five young ministers, and the promise of a

number more. This first coetus or synod was, like the Reformed Dutch church, subordinate to the classis of Amsterdam, until 1793, when it resolved to become independent, the number of churches having increased to one hundred and fifty, though there were yet but twenty-two ordained ministers. On becoming independent, the coetus became the synod, and the church took the name of The High German Reformed Church in distinction from the Low German or Dutch Reformed Church. There was yet a great scarcity of ministers, and as they had no college or theological seminary, it was found impossible to educate their ministry thoroughly, and many errors and irregularities crept into the church. The standard of faith in the Reformed German church was like that of its Holland sister, the Heidelberg catechism, but unlike the Dutch church, it did not adopt the Belgic confession or the canons of the synod of Dort, as defining the sense in which the postulates of the catechism should be held. The rationalism which during the years 1790-1830 was pervading so many of the German churches, was not without its effect here; and this effect was produced more readily because the services of the church were conducted wholly in German until 1825. After a long struggle, a theological seminary was established in 1824, and after two or three removals, finally located at Mercersburg, Pa., in 1835. A religious periodical in English was established in 1828, and one in German in 1836. In 1830 a high school was established at York, which was removed to Mercersburg in 1835, and in 1836 became Marshall College. Seventeen years later (1853) it was consolidated with Franklin College at Lancaster, and removed to that city. The influence of the theological school, under the hands of its able professors Nevin, Rauch, Schaff, and Gerhart, was felt in crystallizing the church into a unity of doctrine and faith which was greatly in contrast with its previous history. Not that there were no dissidents; in their own ranks there were two parties who opposed the Mercersburg philosophy and theology, as it began to be called; those whose sympathies were with the Methodist church, and for whom it was too Calvinistic, and those who adhered to the Belgic confession and the canons of the synod of Dort, or rather went beyond them in their higher Calvinistic leanings. There was also strong opposition manifested to the avowed

boldly made by the Mercersburg theologians that the Church of Rome, despite its many errors, was a part of the Church of Christ, and that Protestantism was a historical continuation of the Church Catholic; opposition also came from without to these views; but on the whole they may be safely asserted to be the views to-day of the great majority of that church. It is a cardinal point in this theology that the Apostle's Creed gives form and vitality to the doctrines of the Heidelberg catechism; and that any explanation of the catechism which leaves this out of the account is defective, and unsound. Rev. Dr. Gerhart thus summarizes the views held by the Mercersburg theologians as thus deduced from the catechism:

“1. Adam, created in the image of God, was endowed with capacity to resist temptation and abide in his original state of life—communion with God; but he transgressed the command of God by a free act of his own will through the instigation of the devil, the head of the kingdom of darkness.

2. The fall of Adam was not that of an individual only, but the fall of the human race.

3. All men are born with the fallen nature of Adam, and are thus under the power of the kingdom of darkness, inclined to all evil, and unapt to any good; and are subject to the wrath of God, who is terribly displeased with their inborn as well as actual sins, and will punish them in just judgment in time and in eternity.

4. The Eternal Law of God, incarnate by the Holy Ghost of the Virgin Mary, true God and true man in one person, is the principle and substance of the new creation.

5. In the mystery of the Word made flesh, the humanity which the Son of God assumed into organic and eternal union with Himself, is the most perfect of supernatural revelation, and the only medium of Divine grace.

6. All the acts of Christ are not those of God or of man separately taken, but the acts of the God-man.

7. His baptism, fasting, and temptation; His miracles and His word; His agony, passion, and death; His descent into Hades; His resurrection from the dead, ascension to heaven, and session at the right hand of God; the coming of the Holy Ghost, and His second advent—all derive their significance and saving virtue from the mysterious constitution of his person.

8. * The atonement for the sin of man is the reconciliation of God and fallen humanity in the person and work of Jesus Christ. It is not simply the offering of himself on the cross, but the whole process of resuming human nature into life, communion with God, and includes both perfect satisfaction to the law by suffering the penalty and all the consequences of sin, and complete victory over the devil. The full benefit of the atonement inures to the believer, because by faith he is a member of Christ, and a partaker of his anointing, and thus stands before God in the life and righteousness of Christ.

9. The Church constituted by the coming of the Holy Ghost, is the mystical body of Christ, a new, real, and objective order of existence, and is both supernatural and natural, divine and human, heavenly and earthly the fulness of him that filleth all in all; in whose communion alone there is redemption from sin, and all its consequences, fellowship with God in Christ, and the hope of complete victory over death and hell, and of eternal glory. The relation which the new regenerated humanity, His mystical body, bears to Christ the head, the second Adam, is analogous to the organic relation which the old, fallen, accursed humanity bears to the first Adam.

10. The sacraments are visible, holy signs and seals, wherein God by an objective transaction, confirms to sinners the promise of the Gospel. They are the means, whereby men through the power of the Holy Ghost are made partakers of the substance of divine grace, that is of Christ and all his benefits.

11. Holy baptism is a divine transaction, wherein the subject is washed with the blood and spirit of Christ from all the pollution of his sins as certainly as he is washed outwardly with water; that is, he is renewed by the Holy Ghost, and sanctified to be a member of Christ, that so he may more and more die unto sin, and lead a holy and unblamable life.

12. Baptized persons do not attain unto the resurrection of the dead and eternal life in virtue simply of holy baptism, but only on the condition that, improving the grace of baptism, they believe from the heart on Christ, die unto sin daily, and lead a holy life, and thus realize the full virtue of the incarnation and atonement.

13. The sacrament of the holy supper is the abiding memorial of the sacrifice of our

blessed Saviour, Jesus Christ, for our sins, upon the cross; the seal of his perpetual presence in the church by the Holy Ghost; the mystical exhibition of his one offering of himself made once, but of force always to put away sin; the pledge of his undying love to his people, and the bond of his living union and fellowship with them to the end of time. In the use of this sacrament, believing communicants do not only commemorate his precious death as the one all-sufficient, vicarious sacrifice for their sins, but Christ himself also, with his crucified body and shed blood, feeds and nourishes their souls to everlasting life; that is, by this visible sign and pledge he assures them that they are really partakers of his true body and blood, through the working of the Holy Ghost, as they receive, by the mouth of the body, these holy tokens in remembrance of him.

14. The bread and wine of the holy supper are not transmuted into the very body and very blood of Christ, but continue to be natural bread and wine; nor is the body and blood of Christ consubstantial, that is, in, with, and under the natural bread and wine, but the sacramental transaction is a holy mystery, in which the full life giving and saving virtue of Christ, mediated through his humanity, is really present by the supernatural power of the Holy Ghost, and communicated to them who, by true faith, eat and drink worthily, discerning the Lord's body.

15. At death the righteous pass into a state of joy and felicity and abide in rest and peace until they reach their consummation of redemption and bliss, in the glorious resurrection of the last day.

16. The second advent of Christ to judge the world in righteousness, will complete the objective order of redemption, and also the subjective process of life and salvation in his body, the church; when the last enemy, which is death, shall be destroyed; when the saints shall come forth from the dead in the full image of their risen Lord, and with Him pass into heaven, the state of perfect blessedness, and the wicked shall rise to the resurrection of eternal damnation."

On points of doctrine not directly connected with the foregoing statements, Dr. Gerhart gives the following summary of the belief of the Reformed Church.

"The church affirms that the person of Christ is the true principle of sound theology; that Christianity is a new life, that the

humanity of Christ is an essential constituent of Christianity; that the Christian church is an organic continuation in time and space of the life powers of the new creation in Christ Jesus; that the covenant is an order or institution of grace, spiritual and real; that the Bible was written by members of the church under plenary inspiration of the Holy Ghost; that private judgment is subordinate to the general judgment of the church as expressed particularly in the Ecumenical creeds; that the Word of God is the only form of faith and practice, and is superior to all creeds and confessions; that the individual comes to a right apprehension of the contents of the Bible through the teaching of the church; that the election of grace unto life is effectual in and by the established economy of grace; that justification is by an act of faith in the person and work of Christ; and consists both in the imputation and impartation of Christ and his righteousness; that holy baptism is the sacrament of regeneration, regeneration being the transition from the state of nature to the state of grace, as natural birth is the transition to the natural world; that regeneration succeeded by conversion and sanctification completes itself in the resurrection from the dead, inasmuch as regeneration and salvation pertain to the entire man, the body no less than the soul; that believers only hold communion with Christ in the Lord's Supper; that the ordinary, divinely ordained means of grace are adequate to all the needs of the church and the world, and if faithfully used do not fail to promote a steady and vigorous growth of the church; that although the church of Rome holds many articles of faith, and approves and perpetuates many customs which are not warranted by the Scriptures and are wrong, she is nevertheless a part of the church of Christ; and that Protestantism is a historical continuation of the Church Catholic, in a new and higher form of faith, organization, and practice."

As to its *worship* the Reformed Church was originally liturgical and though extemporaneous prayer has prevailed during the most of the present century in the regular services of the Lord's Day, there is now a strong tendency to revert to its former liturgical service. After repeated trials and the most careful revision and modifications, the successive liturgical committees of the General and the Eastern Synods have perfected an "Order of worship (including a liturgy)

for the Reformed Church" which was published in 1866, and has been adopted in most of the churches of the Eastern synod, and in some of those of the Western synods. It is gaining ground and will probably be eventually the established book of worship for the entire church.

The government of the church is strictly Presbyterian. The *consistory*, answering to the church session, is composed of the pastor, elders and deacons. Both elders and deacons are chosen by the communicant members, for a term of two, three, or four years, generally two years, and ordained by laying on of hands and installed. When the term expires, the administrative power ceases, but not the office. If reelected, installation is repeated, but not ordination. The *classis* is the first church court above the church, and consists of the ministers and an elder from each parish within a given district. The classes are subject to the synod, which is composed of a given number of ministers and elders, chosen by four or more adjacent classes. The synods are subject to the General Synod, which consists of ministers and elders chosen by all the classes of the church. Appeals to the General Synod may be taken from any of the lower church courts. Infant baptism is faithfully and universally observed. All the children and youth are carefully catechised by the pastor once in two weeks or oftener, for a period of from three to nine months in the year. Catechumens possessing the requisite qualifications are, after examination in presence of the elders, received into the full communion of the church by the rite of confirmation. The holy communion is commonly administered twice a year, and in many of the churches four times. The communicants receive the sacred emblems by companies, standing around the altar. They observe the festivals, Christmas, Good Friday, Easter, and Whit-Sunday with much solemnity.

The statistics of the Reformed (German) Church for 1870, are as follows: one General Synod; four particular synods, viz: the Eastern, or as it is officially called, "The Synod of the Reformed Church in the United States"; "The Synod of Ohio, and adjacent States"; "The Synod of the Reformed Church in the Northwest," and the "Pittsburg Synod of the Reformed Church"; thirty one classes, 526 ministers, 1179 congregations, 217,910 members, of whom, however, only 96,728 are communicants, the

remainder being baptized children and unconfirmed members; 12,776 were baptized, 7,068 confirmed, and 3,592 received on certificate. The number of Sunday Schools reported is 1,019, and of Sunday School scholars 49,960. The amount of benevolent contributions, exclusive of those for congregational purposes, was \$76,453. There are 2 theological seminaries, one at Mercersburg, Pa., with 4 professors, and 28 students; the other at Tiffin, Ohio, with two professors, and 20 students; a mission house at Sheboygan, Wisconsin, with 3 professors, and 22 students. There are two fully organized colleges, Franklin and Marshall, at Lancaster, Pa., and Heidelberg College at Tiffin, Ohio. There are also seven classical institutions, most of them called colleges, five of them in Pa., one in North Carolina, and one in Ohio; and two female seminaries, one at Allentown, Pa., the other at Tyrconnell, Maryland. They have eleven periodicals, two quarterly (reviews), four weekly, and one semi-monthly newspapers; a monthly magazine, and three monthly Sunday School papers. There are two printing establishments, one at Philadelphia, the other at Cleveland, Ohio.

V. METHODISTS.

I. THE METHODIST EPISCOPAL CHURCH.

No denomination, in modern times, has had so rapid a growth as the Methodists. Numbering in its various divisions over two million of communicants, and having an adherent population of nearly eight millions, it seems almost incredible that the first Methodist society was organized in New York City in 1766, and that they had no existence as a distinct church until 1784, when their connection with the Church of England, and with the Protestant Episcopal Church in this country, was formally dissolved, and Thomas Coke, who had received ordination as a *Superintendent* over the Methodist societies in the United States at the hand of John Wesley; and Francis Asbury, whom he had in turn ordained for the same office, met a conference of the Methodist Societies at Baltimore, and there assumed the title and position of "Bishops of the Methodist Episcopal Church in America." This act was displeasing to Mr. Wesley, who protested against it in strong terms, and Dr. Coke,

who subsequently returned to England, never attempted to exercise Episcopal functions there. Still the act was a judicious one, and led to the more rapid development of the great denomination which sprung from such small beginnings.

The history of the Methodist Episcopal Church has been one of almost constant success. There have been, indeed, secessions in considerable numbers from its ranks, as there have from the Wesleyan Methodists of Great Britain, and some of these seceding bodies have themselves attained subsequently a large membership, but the seceders have not left the church on doctrinal grounds but on different views of church polity and discipline. Thus the "African Methodist Episcopal Church" withdrew, in 1787, on account of the prevailing prejudice against persons of color, and the "Zion African Methodist Episcopal Church," in 1820, for the same reason. The "Methodist Protestant Church" withdrew in 1830, on account of differences in regard to the episcopate and lay representation. "The Wesleyan Methodist Connection of America" seceded in 1843, in consequence of a difference of views on slavery, temperance, and church government. "The Methodist Episcopal Church, South," by far the largest of the separating bodies, came off in 1844, from dissatisfaction with the action of the general Conference of that year, requiring Rev. J. O. Andrew, D. D., one of the bishops, to desist from the exercise of his episcopal functions on account of his being a slaveholder. Since 1844 there have been several secessions of small numbers of churches which have generally become extinct or have returned to the church in a few years. The Free Methodists still remain separate, basing their withdrawal on their desire to return to the simplicity, plainness, and avoidance of display, either in dress or in the adornment of their churches, into which, as they allege, the great body of Methodists have fallen. The marvelous growth of the Methodist Episcopal Church is not due to any very great extent, like that of the Roman Catholic Church, to immigration; considerable numbers of Methodists have, indeed, come here from Great Britain, Ireland, and latterly from Germany and Sweden; but many of these have gone into other though kindred denominations. Its great increase has been due to the earnest and constant labors of its ministers, local preachers, and class leaders, to its strong

spirit of propagandism, and to its remarkable adaptation as a religious system, to pioneer life, and to the necessities of a new and only partially settled country. Its triumphs in the western states have been very great; in several of the states, and especially in Indiana and Iowa, its adherent population are said to constitute nearly or quite one-half of the people of the state. Its organization for the promotion of its objects is very efficient. It maintains in most of the large cities, and within convenient distance of each other, its denominational journals, owned by the General Conference, and advocating its measures. It has a book concern, which, after paying over one-third of its capital to the Methodist Episcopal Church, South, and dividing its surplus profits among the annual conferences for the support of enfeebled and superannuated preachers, and the widows and children of those who have died in the ministry, is still the largest publishing house in America, having a net capital of \$1,458,575, and assets to the amount of \$2,649,549 in 1870. Every itinerant minister is, by virtue of his position, a colporteur and propagandist for the sale and distribution of its publications. It has largely engaged in the Sunday School work, and through this means has greatly increased its membership. Its camp meetings, love feasts, classes, and other means of appealing to the emotional element in the nature of men, attract many to its worship and to its communion. The gradations in its ministerial service are admirably adapted to promote efficiency in its ministry. The class-leader in charge of a small section of a church, for whose spiritual growth and welfare he is in some sense responsible, may, if he develops superior gifts become an exhorter; the exhorter in turn may develop into a local preacher, or into an itinerant or circuit preacher, passing through his probation of the diaconate; the itinerant can look forward to becoming a presiding elder over the churches of a District; and from the ranks of these come the editors of the denominational journals, the managers or agents of the book concern and its branches, and the Bishops. These last have varied and arduous labors to perform, and are liable to break down from over-work. They have no dioceses like the bishops of the Roman Catholic, Episcopal, and Moravian churches, but are, in the true sense of the word, bishops,—*episcopoi*,—overseers, of the whole church. They visit and preside over the

annual conferences, assign, in council with the presiding elders, to the itinerants their charges, visit the missionary fields, superintend and manage, in connection with the other officers, the Missionary, Sunday School, and publishing institutions of the church, and constitute, either singly or together, a high court of appeal—in the *interim* of the sessions of the Quadrennial Conference—in matters of church polity and discipline, and in those appertaining to the property or finances of the church.

The college of bishops, when full, has now ten members; but since the Quadrennial Conference of 1868, three, Bishops Thomson, Kingsley, and Clark, have died, and two others are in such feeble health as to be capable of very little labor.

The following statement of the doctrines of the Methodist Episcopal Church is slightly abridged from a declaration of their doctrines, made by Rev. Abel Stevens, D. D., LL. D., the historian of Methodism, and one of their ablest writers.

The doctrines of the Methodist Episcopal Church are contained in twenty-five articles, and are as follows: 1. There is but one living and true God, everlasting, without body or parts, of infinite power, wisdom and goodness, the maker of all things visible and invisible. And in unity of this Godhead, there are three persons, of one substance, power and eternity—the Father, the Son, and the Holy Ghost. 2. The Son, who is the Word of the Father, the very and eternal God, of one substance with the Father, took man's nature in the womb of the blessed Virgin; so that two whole and perfect natures, that is to say, the Godhead and manhood, were joined together in one person, never to be divided, whereof is one Christ, very God and very man, who truly suffered, was crucified, dead and buried, to reconcile his Father to us, and to be a sacrifice, not only for original guilt but also for the actual sins of men. 3. Christ did truly rise again from the dead, and took again his body, with all things appertaining to the perfection of man's nature, wherewith he ascended to heaven, and there sitteth until he return to judge all men at the last day. 4. The Holy Ghost, proceeding from the Father and the Son, is of one substance, majesty, and glory, with the Father and the Son, very and eternal God. 5. The holy Scriptures contain all things necessary to salvation; so that whatsoever is not read therein, nor may be

proved thereby, is not required of any man, that it should be believed as an article of faith, or be thought requisite or necessary to salvation. By the Holy Scriptures we do understand those canonical books of the Old and New Testaments of whose authority was never any doubt in the church. 9. The Old Testament is not contrary to the New, for both in the Old and New Testament everlasting life is offered to mankind by Christ, who is the only mediator between God and man, being both God and man. Wherefore they are not to be heard who feign that the old fathers did look only for transitory promises. Although the law given from God by Moses, as touching ceremonies and rites, doth not bind Christians, nor ought the civil precepts thereof of necessity to be received in any commonwealth, yet notwithstanding, no Christian whatever is free from the obedience of the commandments which are called moral. 7. Original sin standeth not in the following of Adam, as the Pelagians do vainly talk, but it is the corruption of the nature of every man that is naturally engendered of the offspring of Adam, whereby man is very far gone from original righteousness, and of his own nature inclined to evil, and that continually. 8. The condition of man after the fall of Adam is such, that he cannot turn and prepare himself, by his own natural strength and works, to faith and calling upon God; wherefore we have no power to do good works, pleasant and acceptable to God, without the grace of God by Christ preventing us, that we may have a good will, and working with us when we have that good will. 9. We are accounted righteous before God, only for the merit of our Lord and Saviour Jesus Christ by faith, and not for our own works or deservings; wherefore, that we are justified by faith only, is a most wholesome doctrine and very full of comfort. 10. Although good works which are the fruits of faith, and follow after justification, cannot put away our sins, and endure the severity of God's judgments, yet are they pleasing and acceptable to God in Christ, and spring out of a true and lively faith, insomuch that by them a lively faith may be as evidently known as a tree is discerned by its fruit. 11. Voluntary works, beside, over and above God's commandments, cannot be taught without arrogance and impiety. For by them men do declare that they do not only render to God as much as they are bound to do, but they do more for his sake than of bounden

duty is required ; whereas Christ saith plainly : When ye have done all that is commanded you, say, We are unprofitable servants. 12. Not every sin willingly committed after justification is the sin against the Holy Ghost and unpardonable. Wherefore the grant of repentance is not to be denied to such as fall into sin after justification ; after we have received the Holy Ghost we may fall into sin, and by the grace of God rise again and amend ourselves. And therefore they are to be condemned who say they can no more sin as long as they live here, or deny the place of forgiveness to such as truly repent.

13. The visible Church of Christ is a congregation of faithful men, in which the pure Word of God is preached, and the sacraments duly administered according to Christ's ordinance in all those things that of necessity are requisite to the same.

14. The Romish doctrine concerning purgatory, pardon, worshipping and adoration as well of images as of relics, and also invocation of saints, is a fond thing vainly invented and grounded upon no warrant of Scripture, but repugnant to the Word of God.

15. It is a thing plainly repugnant to the Word of God, and the custom of the primitive church, to have public prayers in the church, or to administer the sacraments, in a tongue not understood by the people.

16. Sacraments ordained of Christ are not only badges or tokens of Christian men's profession, but, rather, they are certain signs of grace, and God's good will toward us, by the which he doth work invisibly in us, and doth not only quicken, but also strengthen and confirm our faith in him. There are two sacraments ordained of Christ our Lord in the gospel ; that is to say, baptism and the supper of the Lord. Those five commonly called sacraments : that is to say, confirmation, penance, orders, matrimony, and extreme unction, cannot be counted for sacraments of the gospel, being such as have partly grown out of the corrupt following of the apostles, and partly are states of life allowed in the Scriptures, but yet have not the like nature of baptism and the Lord's supper, because they have not any visible sign or ceremony ordained of God. The sacraments were not ordained of Christ to be gazed upon, or to be carried about ; but that we should duly use them. And in such only as worthily receive the same, they have a wholesome effect or operation ; but they that

receive them unworthily, purchase to themselves condemnation, as St. Paul saith, 1 Cor. xi : 29.

17. Baptism is not only a sign of profession, and mark of difference, whereby Christians are distinguished from others that are not baptized, but it is also a sign of regeneration, or the new birth. The baptism of young children is to be retained in the Church.

18. The supper of the Lord is not only a sign of the love that Christians ought to have among themselves one to the other, but rather is a sacrament of our redemption by Christ's death ; inasmuch that to such as rightly, worthily, and with faith receive the same, the bread which we break is the partaking of the body of Christ, and the wine which we drink is a partaking of the blood of Christ. Transubstantiation, or the change of the substance of the bread and wine in the supper of the Lord cannot be proved by Holy Writ, but is repugnant to the plain words of Scripture, overthroweth the nature of a sacrament, and hath given occasion to many superstitions. The body of Christ is given and taken in the supper, only after a heavenly and spiritual manner ; and the means whereby the body of Christ is received and taken in the supper, is faith. The sacrament of the Lord's supper was not by Christ's ordinance reserved, carried about, lifted up, or worshipped.

19. The cup of the Lord is not to be denied to the lay people, for both the parts of the Lord's supper, by Christ's ordinance and commandment, ought to be administered to all Christians alike.

20. The offering of Christ, once made, is that perfect redemption, propitiation and satisfaction for all the sins of the whole world, both original and actual, and there is none other satisfaction for sin but that alone. Wherefore the sacrifice of masses, in the which it is commonly said that the priest doth offer Christ for the quick and the dead, to have remission of pain or guilt, is a blasphemous fable and dangerous deceit.

21. The ministers of Christ are not commanded by God's law either to vow the state of single life, or to abstain from marriage ; therefore it is lawful for them, as for all other Christians, to marry at their own discretion, as they shall judge the same to serve best to godliness.

22. It is not necessary that rites and ceremonies should in all places be the same, or exactly alike, for they have been always dif-

ferent, and may be changed according to the diversity of countries, times, and men's manners, so that nothing be ordained against God's Word. Whosoever, through his private judgment, willingly and purposely doth openly break the rites and ceremonies of the church to which he belongs which are not repugnant to the Word of God, and are ordained and approved by common authority, ought to be rebuked openly, that others may fear to do the like, as one that offendeth against the common order of the church, and woundeth the consciences of weak brethren. Every particular church may ordain, change or abolish rites and ceremonies, so that all things may be done to edification.

23. The president, the Congress, the General Assemblies, the Governor, the Councils of State, as the delegates of the people, are the rulers of the United States of America, according to the division of power made to them by the Constitution of the United States, and by the constitutions of their respective states. And the said states are a sovereign and independent nation and ought not to be subject to any foreign jurisdiction.

24. The riches and goods of Christians are not common, as touching the right, title, and possession of the same, as some do falsely boast. Notwithstanding, every man ought, of such things as he possesseth, liberally to give alms to the poor, according to his ability.

25. As we confess that vain and rash swearing is forbidden Christian men, by our Lord Jesus Christ, and James his apostle, so we judge that the Christian religion doth not prohibit, but that a man may swear when the magistrate requireth, in a cause of faith and charity, so it be done according to the prophet's teaching, 'in justice, judgment, and truth.'"

It is proper to notice that as the Methodist church, founded by Wesley, was really an offshoot from the Church of England, much of the phrasology of these articles is taken from the doctrinal standards of that Church.

The legislative power of the church resides in its General Conference, which meets every four years, and to which the 72 annual conferences are subject. This General Conference has hitherto been composed of clerical delegates appointed by the several Annual Conferences. The General Conference of 1872 will, however, have a proportion of lay delegates, as do now the Annual Conferences; lay representation having been approved by

a two-thirds vote of the membership in 1869, after having agitated the church more or less for forty years, and having been the basis of one or two secessions. The General Conference governs and controls the entire Church, but is restricted by its constitution on certain points relative to its doctrines, polity, and distribution of its funds.

The Annual Conferences consist of all the traveling preachers, deacons, and presiding elders of a certain portion of country, usually comprising several districts, each under the charge of a presiding elder. There are now also admitted to these conferences delegations of the laity equal in number to the clerical representation. Each conference is presided over by a bishop. The main business transacted at these conferences is the admission and ordination of preachers; an examination of the character and official administration of the ministers belonging to the Conference; a review of the missionary, educational, and publishing interests; the apportionment of the Conference funds to infirm and superannuated preachers, and to the widows and orphans of such within the Conference; and the assignment of the ministers to their several stations and circuits for the year ensuing. In each district there is held a quarterly conference, composed of the traveling and local ministers, the exhorters, stewards, class-leaders, and superintendants of Sunday Schools. These conferences are presided over by the presiding elder of the district, and manage the details of local interests connected with the stations or circuits; serve as courts of appeal in the trial of church members; grant licenses to preach, and recommend suitable candidates for admission into the Annual Conference. The theory of the itinerancy in the Methodist church as defined by Wesley, was, that it incited the preachers to a greater measure of zeal and enthusiasm as they addressed new congregations so often; that it made the congregations or churches more attentive to the gospel and less attached to the persons of those who proclaimed it; that by this method of distributing the various classes of gifts the smaller and poorer locations were sure of receiving a share of the best gifts of which they would otherwise be deprived; and that, not being influenced by local attachments, the preachers would be better fitted to act as pioneers on the frontiers, where, otherwise, they might be less willing to go. In its practical working other advan-

tages and disadvantages have been developed; and while in a new section of country, it proves successful and has accomplished great good, it is every year becoming more distasteful to the clergymen and churches in the more densely populated portions of the country. In the cities and larger towns the circuit feature has almost entirely disappeared; the ministers are pastors of single churches, the only difference being that their stay is limited with a single church. This limit was formerly two years, but the Conference of 1868 made it three years. The more eloquent and popular preachers, however, often manage to evade this limit by securing an appointment in the same city in some different capacity, which will allow them to remain as practical pastors of the churches to which they are attached. With indolent and half educated ministers it is alleged that the itinerancy encourages idleness, as it renders any considerable study, beyond the preparation of plans of sermons for the first year or two years, unnecessary; but the Methodist ministry has but a small proportion of drones. To be eligible to full connection in an annual Conference and the office of deacon, a preacher must have traveled two years as a probationer and stood suitable examinations. He is eligible to elders' or ministers' orders after two years further service and another examination. Preachers—i. e., licensed exhorters and deacons—are not authorized to baptize or administer the Lord's Supper. Elders or ministers are ordained by the bishops, and may administer all the ordinances. Stewards are persons chosen by the Quarterly Conferences to take charge of and disburse all funds collected for the poor, the support of the ministry, and sacramental purposes. Class-leaders are appointed by the ministers; their duty is to see all the members of their respective classes once a week, to learn their spiritual condition, and to receive their contributions for church purposes. Classes usually consist of twelve or more persons.

The statistics of the Methodist Episcopal Church, in 1870, were as follows: Bishops 8; travelling preachers, 9,193; local preachers, 11,404; total preachers, 21,234; members in full connection, 1,173,099; members on probation, 194,035; total lay members, 1,367,134; adult baptisms, 66,481; infant baptisms, 50,453; total baptisms, 116,934; number of churches, 13,373; number of parsonage, 4,179; value of church edifices, \$52,-

614,591; value of parsonages, \$7,293,513; number of Sunday schools, 16,912; number of Sunday school teachers, 189,412; number of Sunday school scholars, 1,221,393; amount of benevolent collections, (aside from church expenses,) \$967,862.

II. THE METHODIST EPISCOPAL CHURCH, SOUTH. This body seceded from the "Methodist Episcopal Church" in 1844, on the following grounds: It was well known that John Wesley, the founder of Methodism, was opposed to slavery, declaring it to be "the sum of all villainies;" but the Methodist Episcopal Church having a large membership in the Southern states, had grown lax on the subject, and as for many years there was very little agitation on the question, many slaveholders became members and a considerable number ministers of the church. In 1828, one of these latter, known to be a slaveholder, was sent as the representative of the Methodist Episcopal Church to the British Wesleyan Conference. In 1840, the General Conference declared by formal resolution, that "the mere ownership of slave property, in states or territories where the laws do not admit of emancipation, and permit the liberated slave to enjoy freedom, constitutes no legal barrier to the election or ordination of ministers to the various grades of office known in the ministry of the "Methodist Episcopal Church." In 1844, however, the feeling of opposition to slavery began to be renewed in the General Conference, which was held in New York City, and proceedings not assuming judicial form, and unaccompanied with any regular impeachment, were instituted against Rev. James O. Andrew, D. D., who had been one of the bishops since 1832, a citizen of Georgia, who had married a lady possessing many slaves. These proceedings, after a protracted debate, were terminated by an act passed by a majority of the Conference requiring the bishop to desist from his functions, on account of this connection with slavery. Thereupon the representatives of thirteen of the thirty-three annual conferences of which the church was then composed, (being those embraced in the slaveholding states,) presented a declaration which set forth their solemn conviction that a continuance of the jurisdiction of the General Conference over the annual conferences thus represented, would be inconsistent with the success of the Methodist ministry in the slaveholding states. The declaration was accompanied by a for-

mal protest against the action of the majority in Bishop Andrew's case, and thus led to the adoption by the General Conference of a plan of separation, according to which there was contemplated an amicable adjustment of boundary lines, and a fair division of property, should the annual conferences in the slaveholding states find it necessary to unite in an ecclesiastical connection distinct from that of the North. The church in the South and South-west, in primary assemblies, and in quarterly and annual conferences, sustained the declaration of the delegates, and measures were immediately adopted for the assembling of a convention. This was held in May, 1845, at Louisville, Ky. Acting under the provisions of the plan of separation, and in pursuance of the formal instructions of the annual conferences, the convention dissolved the jurisdiction of the General Conference over the conferences there represented, and created a separate ecclesiastical connection under the title of "The Methodist Episcopal Church, South." The first General Conference of this organization was held at Petersburg, Va., in 1846. There was some difficulty in arranging all the details for the separation, and owing to the repudiation of the plan of separation by the General Conference of the "Methodist Episcopal Church" in 1848, the division of the property of the Book concern, *pro rata*, was only accomplished after a lawsuit in 1853. In 1845 the statistics of the Methodist Episcopal Church, South, were: 5 bishops, 13 annual conferences, 1,384 traveling preachers, 90 superannuated preachers, 2,550 local preachers, 330,710 white members, 124,811 colored members, 2,978 Indians; total 462,428. This was almost one-half of the whole membership of the Methodist Episcopal Church before the division. In 1859, there were six bishops, 24 annual preachers, 1,661 traveling preachers, 5,177 local preachers, 511,601 white members, 197,348 colored members, 4,236 Indians; total, 721,023. They continued to increase until the war, when they lost a large number of their colored members, who preferred the African organizations, and after the emancipation proclamation, and the ratification of the XIVth and XVth amendments to the constitution of the United States, the basis on which they had made their separation was removed. The twenty-seven years of separate organization have however, made them indisposed for a reunion, and they

repel all overtures looking to such a measure, with considerable bitterness. Their doctrinal views are identical with those of the "Methodist Episcopal Church," and there is no difference in their polity or discipline. They have now when the board of bishops is full, nine, but Bishop Andrew having recently deceased, there are but eight now acting; there are 30 conferences, 2,646 traveling and 187 superannuated preachers, 4,753 local preachers, 540,820 white members, 19,616 colored members, (only one tenth of what they had in 1829,) 3,149 Indians; a total of 571,241.

III. and IV. The two AFRICAN METHODIST EPISCOPAL CHURCHES. The A. M. E. Church proper, and the Zion A. M. E. Church may perhaps with propriety be considered together, inasmuch as overtures are now pending for their consolidation. Both profess to be identical in their doctrinal views with the Methodist Episcopal Church, and their polity and government differ but slightly. The first has bishops, but permits lay representation to a limited extent in its General Conference from the ranks of the local preachers, and gives in its annual conferences equal privileges to the traveling and local preachers. The Zion Church has no bishops, but general superintendents in their place, elected every four years. Its General Conference is composed of all the traveling ministers in the connection, but no lay delegation is allowed. An African church seceded in 1787, under the name of the Bethel African M. E. Church, but this was subsequently absorbed into the Methodist Episcopal Church. In 1816, however, some of the more eminent of the colored Methodist ministers believing that they could be freer and more useful in a separate communion, called a convention in Philadelphia, and organized the "African Methodist Episcopal Church. Its growth has been moderate but steady until the emancipation proclamation in 1863, which has led to a great increase in its membership. It has now ten conferences, seven bishops, over 600 traveling and 1200 local preachers, 586 churches, 200,000 communicants, over 500 Sunday Schools, and more than 1200 day schools. Its adherent population is not less than 600,000. The property of the Church, in schools, colleges, and church edifices, exceeds four million dollars. It owns Wilberforce University, near Xenia, Green Co., Ohio, and four seminaries of a high class at Baltimore,

Md.; Columbus, Ohio; Alleghany, and Pittsburgh, Pa. They have a Book concern at Philadelphia, and issue a weekly and a monthly religious periodical.

The "*African Methodist Episcopal Zion Church*" seceded from the Methodist Episcopal Church in 1820, and held its first annual conference in New York, in 1821. Its secession was in consequence of some differences of opinion in regard to church government. Its growth was slow until the war, when it shared with the African M. E. Church, in the large influx of colored Methodists previously connected with the church south, and in a very large accession of new converts. Being very much straitened for means for the support of their schools and churches just after the war, they appealed to Congregationalists, to Unitarians, and to Friends for assistance, and received a considerable amount from each. They had expected to consummate a union with the African M. E. Church in 1868, but from some cause the union has been delayed, but will probably be completed in 1872. They have six general superintendents (answering to bishops, but elected for four years), 694 traveling and about 1300 local preachers, nearly 700 churches, and about 164,000 members.

V. THE EVANGELICAL ASSOCIATION, called also *Albright Methodists*, from the name of their founder, is an ecclesiastical body of great energy and activity, which took its rise in Eastern Pennsylvania, about 1790, from the labors of Rev. Jacob Albright, a German Methodist minister, who sought to promote a religious reform among the Germans of that region. It was not organized as a church till about 1800, when Mr. Albright was unanimously elected and ordained as their pastor and bishop.

Sixteen years later they had become so numerous as to organize a general conference. For the first thirty years of their existence, the Evangelical Association met with violent opposition, but since 1830 it has made rapid progress. In doctrines and theology the association is substantially one with the Methodist Episcopal Church; and its mode of worship and usages are essentially Methodist; in its church government it has a General Conference meeting every four years, and constituting its highest legislative and judicial authority. The General Conference elects its bishops for four years; they may be re-elected, but if not, hold no

higher rank or privilege than an elder after their term of service is expired. The annual conferences elect their presiding elders for the same term, and these return to the itinerancy at the expiration of their term of service. There are also quarterly conferences, in which a lay delegation is allowed, but not in the Annual or General Conferences. The statistics of the "Evangelical Association" in 1869 were as follows: 29 bishops, fourteen annual conferences, 798 churches, 500 itinerant, and 377 local preachers, 65,691 members, 863 Sunday Schools, with 45,175 scholars, 153 mission stations in America, and Europe; a full complement of Missionary, Sunday School, Tract, and Charitable societies, a publishing house at Cleveland; four periodicals, a college, an orphan institution, several seminaries, 207 parsonages, and church property to the value of about \$2,000,000.

VI. THE "METHODIST PROTESTANT CHURCH," an organization which was formed of seceders from the "Methodist Episcopal Church" in 1830, the secession being based on the grounds of dissatisfaction with the Episcopate, and the refusal of lay representation. In doctrinal views, they accept the standards of the Methodist Episcopal Church, but have no bishops. Their general conference, which meets once in seven years, and is composed of one ministerial and one lay delegate for every thousand communicants, is the governing body; and in the *interim* of its sessions, its president and the officers of the different committees and societies created by it, exercise administrative authority to a limited extent. The annual conferences, composed of ministers only, elect their own presidents, and possess authority within their own bounds. Its quarterly conferences, exhorters, class-leaders, stewards, etc., are copied after the Methodist Episcopal pattern. The church had in 1870 423 itinerant, and about 860 local preachers, nearly 900 churches, and about 72,000 communicants. It does not seem to be growing, for its statistics in 1858 were considerably larger than these figures. It has seven collegiate institutions, three of them for females; two other literary institutions; small book concerns at Baltimore, Md., and Springfield, Ohio, and four periodicals.

VII. "THE METHODIST CHURCH," is another branch of the Methodist family, of which we only know that it reported in 1870 624 preachers, and 49,030 members. Its

doctrines are probably not different from those of the other Methodist bodies; it has, we believe, no bishops.

VIII. "THE WESLEYAN METHODIST CONNECTION OF AMERICA," was organized in 1843, and composed mainly of seceders from the "Methodist Episcopal Church." The seceders were strongly opposed to slavery, and desirous of having the church purged from it; they were also ardent temperance men, and hostile to all traffic in intoxicating liquors as a beverage. The "Methodist Episcopal Church," which subsequently took advanced grounds on both these subjects, was not at this time willing to do so, and disciplined its members who urged it. The consequence was the organization of the Wesleyan Methodist Connection of America, at Utica, May 31, 1843. Their doctrines are the same with those of the Methodist Episcopal Church, except two rules of morality, one excluding from church membership and Christian fellowship all who buy or sell men, women, or children, with intent to enslave, or hold them as slaves, or claim that it is right to do so; and the other, excluding from membership or fellowship all who manufacture, buy, sell, or use intoxicating liquors, or in any way, intentionally and knowingly, aid others so to do, except for mechanical, chemical, or medicinal purposes. In its church government, the Wesleyan Connection is democratic, holding to complete ministerial equality and the power of each church to act for itself. They have an equal representation of ministers and laymen in their general conference, and these are elected by the annual conferences which are composed of all the ministers and an equal number of laymen in their several geographical bounds. They do not seem to have increased since the war, numbering only 250 ministers, and about 20,000 communicants in 1870, against 300 ministers, and 20,000 members in 1858. They have two collegiate institutions, one at St. Louis, Jackson Co., Mich., the other—the Illinois Institute—at Wheaton, Du Page Co., Illinois. They have also one newspaper, "*The True Wesleyan*."

IX. THE FREE METHODISTS are the latest seceders from the Methodist Episcopal Church. They profess to have left it on the ground of its increasing formalism and conformity to worldly customs and fashions in dress, and in the construction, adornment, and music of the churches. They advocate

a return to the early plainness of costume, the avoidance of all ornaments and jewelry, and the simplicity and bareness of architecture which characterized the early Methodists and their houses of worship. With this they also desire to restore the ancient zeal, fervor, and earnestness of the immediate followers of Wesley and his successors. They number about one hundred ministers, and perhaps 7,000 communicants, and have a newspaper — *The Free Methodist* — edited with a good deal of zeal and spirit.

X. THE PRIMITIVE METHODIST CHURCH is a branch of the church of the same name in Great Britain, but has not attained to any very considerable numbers here; its members being mostly immigrants who had been connected with it before migrating to this country. In England it originated in 1807, in a secession from the Wesleys, on grounds of polity; the seceders desiring to maintain camp meetings, house to house visitation and religious outdoor services, and the employment of female preachers to some extent, with a view to reach the lower and more depraved classes, and the Wesleys declining to sanction any such movements. The Primitive Methodists, like the Free Methodists, are very zealous and earnest. Their doctrines do not differ from those of Wesley; but in church government they are democratic, having no bishops, and in their conferences, have two lay delegates for every minister. They number in the United States about 20 itinerant, and 35 or 40 local preachers, nearly 40 churches, and a membership of about 2,200.

XI. THE WELSH CALVINISTIC METHODISTS are not a numerous body in the United States, and are only Methodists in their church polity and government, their doctrinal views being more Calvinistic than Arminian, and assimilating in this respect to the Congregationalists, or to the Calvinistic portion of the clergy of the Church of England. They were in England an outgrowth of the labors of Whitfield and his successors. Indirectly, they were also a result of the organization of Lady Huntingdon's Connexion, with which their doctrinal views fully corresponded. In the United States they are found principally among the Welsh, and some efforts to organize other churches, as Congregational Methodists, i. e., with Calvinistic doctrines, and Methodist polity and government, have proved failures, the churches either becoming wholly Congrega-

tional, or joining some of the Methodist sects. The Welsh Calvinistic Methodists number probably not more than 3,000 communicants.

XII. UNITED BRETHREN IN CHRIST, OR GERMAN METHODISTS. This denomination, though not properly Methodists in name, are yet so far in unison with them in doctrines and polity, that they come more appropriately under the classification of *Methodists* than any other. The "United Brethren in Christ" owe their origin to the labors of Philip James Otterbein, a native of Dillenburg, Germany, born June 4, 1726, and ordained to the ministry of the German Reformed Church, at Herborn, Germany, in 1749. He was sent to America as a missionary by the Synod of Holland in 1752, and settled at Lancaster, Pennsylvania. Not long after his arrival he became convinced that he was a stranger to vital godliness, and ere long experienced, as he believed, a change of heart. He very soon began to manifest his zeal by instituting meetings during the week for prayer and religious conference, and finding that the region round about was in a condition of great spiritual destitution he made long preaching tours, and held what were called "great meetings" in barns and groves throughout that region, his labors being attended with great success. Persons who had experienced a change of heart, whatever their ecclesiastical relations, were invited to take a part in these meetings, and among those who accepted the invitation was Martin Boehm, a Mennonite preacher of great zeal and earnestness. At the close of one of Boehm's most effective sermons Otterbein rose, and embracing him exclaimed: "We are brethren!" The name of United Brethren in Christ was adopted by their followers from this time. Otterbein and Boehm labored together for more than fifty years; and what at first seemed a revival in the different churches gradually became agglomerated into a distinct denomination, with its hundreds of preachers, called for the most part from the working classes, and exercising their gifts at first as lay preachers and subsequently licensed and ordained by the leaders or by some of those whom they had set apart for the ministry. At Otterbein's death, in 1813, the "Brethren" were already a large and influential body; they have since increased with considerable rapidity, and adopting the Methodist polity of quarterly, annual, and general Conferences,

itinerants, bishops, and presiding elders, they have come to be a well organized and efficient body. Their first organization as distinct churches dates, we believe, from 1774.

In their theological views they are Arminians, agreeing very nearly with the Wesleyan Methodists in England, and the Methodist Episcopal Church in the United States. On a few points only are they peculiar. In common with most of the evangelical churches they require evidence of a change of heart as indispensable to membership, but they prohibit membership to slaveholders, to adhering members of any secret society or organization, and to those who manufacture, sell, or drink intoxicating liquors. Baptism is administered either by pouring, sprinkling, or immersion, as the candidate may prefer; infants are baptized when desired. Open communion is practised and the ordinance of foot-washing, as observed by several of the minor German sects, is optional, some of the churches observing it, while others do not. For the first fifty years of their history their ministers confined their labors almost exclusively to the German-speaking population, but now they have as many English as German churches. Their statistics in 1870 were as follows: thirty-eight annual conferences, one general conference, four bishops who are elected for four years, and may be re-elected, about 900 itinerant and over 800 local preachers; 3,924 organized societies; 1,473 church edifices, with 483,099 settings; 118,055 members; 2,420 Sunday schools, with 16,417 teachers and 112,425 scholars; collections for church purposes, 580,288; value of church property, \$2,506,600. They have at Dayton, Ohio, an extensive publishing establishment which issues numerous books, and beside an annual almanac or year book, five periodicals; a German and an English weekly religious newspaper, a monthly German, and a semi-monthly English, child's paper, and a missionary periodical in English, semi-monthly. They have six colleges; Otterbein University at Westville, Ohio; Hartsville University, at Hartsville, Ind.; Westfield College, at Westfield, Ill.; Lebanon Valley College, Annville, Pa.; Lane University, Lecompton, Kan.; and Western College, Western Iowa. Sublimity College, Oregon, has passed out of their hands for want of adequate funds for buildings and endowment. They have also three or four female seminaries and collegiate schools.

V. CONGREGATIONALISTS.

In its broadest sense the name CONGREGATIONALIST is applicable to all the denominations which hold to the independence of each church and to the democratic form of church government and polity. In this sense the Regular Baptists, and, indeed, almost all the denominations which we have ranged under the general head of "Baptists" as well as the Friends, the Unitarians, and the Universalists, are as truly Congregationalists as the churches distinctively known by that name. In common usage, however, the name is applied almost exclusively to those churches which are Augustinian and Calvinistic in doctrine, Trinitarian in belief, and Pædo-baptist in practice; and who holding these views unite with them a democratic church polity, the independence of each church, and a fellowship and inter-communion with all churches holding like views.

While there were undoubtedly isolated congregations in England in the sixteenth century, which maintained substantially congregational views and organization, Rev. John Robinson, first of Scrooby, Nottinghamshire, England, and afterwards of Leyden, Holland, is generally regarded as the father of Congregationalism. His church was organized in 1606, and removed almost bodily to Holland in 1608 in consequence of persecution. After a pastorate of about twelve years in Amsterdam and Leyden, a majority of the church, under Elder William Brewster, determined to emigrate to America, and after many perils and troubles, landed at Plymouth, Massachusetts, Dec. 21, 1620, having previously organized as an independent church and as a civil community. Others followed soon after, and Robinson himself intended to come, but died just as he was about to sail. The colonists of Massachusetts Bay were at first Non-conformists, but they presently adopted the Congregational Order. In Massachusetts and Connecticut, as well as in the then province of Maine, and the colonies of New Hampshire and Vermont, at a later period, the Congregationalists were the dominant sect or denomination, and in the two former colonies and subsequent states, retained a somewhat peculiar connection with the state, which, though modified, was not wholly abrogated in Connecticut till 1818, and in Massachusetts in 1833. Every householder, or person liable to pay taxes, was regarded as primarily subject to a tax for the support of religious worship in

the Congregational church, or, as it was usually called "the standing order;" and this liability, if he possessed property, could only be avoided by his "signing off," or avowing himself a tax-payer for the support of some other of the tolerated denominations. At first even this was not permitted, except in the case of members of the Church of England, but gradually more liberal views prevailed. This compulsory taxation was abrogated in Connecticut by the constitutional amendment, in 1833. In 1770, the number of communicants in the Congregational churches of the thirteen colonies was about 112,000, almost all of whom were in New England, though two or three churches were planted about that time in Georgia and South Carolina. In 1801, a Plan of Union was agreed upon between the Presbyterian Church and the General Association (of Congregationalists) of Connecticut, which, at that time was an active missionary body. This plan of Union provided that in any new place where there were members of Congregational and Presbyterian churches, to avoid the establishment of weak and feeble churches, the members of the two denominations should unite to form a church which should be either Presbyterian or Congregational as the majority of its members might decide, and if Congregational, that it should still have a qualified right of representation in the Presbytery. Under this arrangement, which continued in full force till 1837, and was not completely abrogated till 1852, the greater part of the advantages enured to the Presbyterians, very few Congregational churches being organized in the middle and western states, and a considerable portion even of these, under the arrangement for representation in the Presbyteries, gradually becoming Presbyterian. It resulted from this liberality, that while there were nearly a hundred thousand former members of Congregational churches who had contributed to swell the numbers of the Presbyterian and Reformed churches, the actual number of communicants in Congregational churches in the entire country, in 1850, at the expiration of eighty years from 1770, did not much exceed 200,000. There had been in this interval, it is true, a very considerable loss in Massachusetts (mostly from 1810 to 1830) by the falling away of the Unitarians. This had probably caused a diminution of fifteen to eighteen thousand members. But soon



after 1840 there was a spirit of greater activity and aggressive action roused in the Congregational churches. This found expression, in 1852, in the National Congregational Convention, a sort of General Synod or Council, which met at Albany. This Convention initiated measures for greater denominational missionary activity, advised the raising of a fund of \$100,000 to aid in the erection of Congregational churches in the new states and territories, and largely increased efforts for the extension of Congregationalism as a denominational organization. As a result of this Convention and the spirit which prompted it, the growth of the denomination has been rapid and healthy in the western states and territories, and during the recent war and since, it has proved itself possessed of great energy and ability in propagating Christianity in its simpler forms throughout the country. The Presbyterians and the Reformed (Dutch) Church had formerly been associated with the Congregationalists in both Home and Foreign Missionary enterprises, but the Old School branch of the Presbyterians withdrew from both about 1837; the Reformed, in 1857; and the New School branch of the Presbyterians partially from the Home Missionary Society in 1853 or 1854, and wholly in 1865, and from the American Missionary Association about the same time; and at the reunion of the two branches of the Presbyterian church in 1870, the New School members withdrew also from the American Board of Commissioners of Foreign Missions, taking with them three or four of the Missions. The Congregationalists have, however, manfully taken the entire burden on their own shoulders, and are maintaining these organizations in their full vigor. In 1865, another General Synod, or National Council, was held in Boston, which has resulted in a further development of denominational as well as of Christian activity. This Council adopted a *Declaration of Faith*, the first authoritative exposition of their views of doctrine and polity, which had had the full sanction of the denomination; though earlier General Synods—those of Cambridge in 1637 and 1646—and the partial one of Saybrook in 1708, had adopted in general terms, and for substance of doctrine, the Westminster and Savoy Confessions of Faith, and the "Cambridge Platform," and the "Saybrook Platform" of polity and discipline.

This "*Declaration of Faith*," adopted in

1865, on Burial Hill, Plymouth, Mass., is as follows:

"Standing by the rock where the Pilgrims set foot upon these shores, upon the spot where they worshipped God, and among the graves of the early generations, we, elders and messengers of the Congregational churches of the United States in National Council assembled, like them acknowledging no rule of faith, but the Word of God, do now declare our adherence to the faith and order of the apostolic and primitive churches held by our fathers, and substantially as embodied in the confessions and platforms which our synods of 1648 and 1680 set forth or re-affirmed. We declare that the experience of the nearly two and a half centuries which have elapsed since the memorable day when our sires founded here a Christian commonwealth, with all the development of new forms of error since their times, has only deepened our confidence in the faith and polity of those fathers. We bless God for the inheritance of these doctrines. We invoke the help of the Divine Redeemer, that through the presence of the promised Comforter he will enable us to transmit them in purity to our children.

"In the times that are before us as a nation, times at once of duty and danger, we rest all our hope in the Gospel of the Son of God. It was the grand peculiarity of our Puritan fathers, that they held this Gospel, not merely as the ground of their personal salvation, but as declaring the worth of man by the incarnation and sacrifice of the Son of God; and therefore applied its principles to elevate society, to regulate education, to civilize humanity, to purify law, to reform the church and the state, and to assert and defend liberty; in short, to mould and redeem, by its all-transforming energy, everything which belongs to man in his individual and social relations.

"It was the faith of our fathers that gave us this free land in which we dwell. It is by this faith only that we can transmit to our children a free and happy, because a Christian, commonwealth.

"We hold it to be a distinctive excellence of our Congregational system, that it exalts that which is more, above that which is less important, and by the simplicity of its organization facilities, in communities where the population is limited, the union of all true believers in one Christian church; and that the division of such communities into several weak and jealous societies, holding the same

common faith, is a sin against the unity of the body of Christ, and at once the shame and scandal of Christendom.

"We rejoice that through the influence of our free system of apostolic order, we can hold fellowship with all who acknowledge Christ and act efficiently in the work of restoring unity to the divided church, and bringing back harmony and peace among all who love our Lord Jesus Christ in sincerity.

"Thus recognizing the unity of the Church of Christ in the world, and knowing that we are but one branch of Christ's people, while adhering to our peculiar faith and order, we extend to all believers the hand of Christian fellowship upon the basis of those great fundamental truths in which all Christians should agree. With them we confess our faith in God, the Father, the Son, and the Holy Ghost, the only living and true God; in Jesus Christ, the incarnate Word, who is exalted to be our Redeemer and King; and in the Holy Comforter, who is present in the Church to regenerate and sanctify the soul.

"With the whole Church, we confess the common sinfulness and ruin of our race, and acknowledge that it is only through the work accomplished by the life and expiatory death of Christ, that believers in him are justified before God, receive the remission of sins, and through the presence and grace of the Holy Comforter, are delivered from the power of sin, and perfected in holiness.

"We believe, also, in the organized and visible Church, in the ministry of the Word, in the sacraments of Baptism and the Lord's Supper, in the resurrection of the body, and in the final judgment, the issues of which are eternal life, and everlasting punishment.

"We receive these truths on the testimony of God, given through prophets and apostles, and in the life, the miracles, the death, the resurrection of His Son, our Divine Redeemer,—a testimony preserved for the Church in the Scriptures of the Old and New Testaments, which were composed by holy men as they were moved by the Holy Ghost.

"Affirming now our belief that those who thus hold 'one faith, one Lord, one baptism,' together constitute the one Catholic Church, the several households of which, though called by different names, are the one body of Christ, and that these members of His body are sacredly bound to keep 'the unity of the Spirit in the bonds of peace,' we declare that we will cooperate with all who hold these

truths. With them we will carry the Gospel into every part of this land, and with them we will go into all the world and 'preach the Gospel to every creature.' May He to whom 'all power is given in Heaven and earth,' fulfil the promise which is all our hope: 'Lo, I am with you alway, even to the end of the world.' Amen."

As we have already said, the Congregationalists are Pædo-baptists, though infant baptism is far from being as universal with them as it was formerly. Baptized children are not admitted to full membership in the church, except on evidence of conversion, and a profession of their faith in Christ. The usual mode of baptism is by affusion or sprinkling, but most of their clergymen administer the ordinance by pouring, or by immersion, if the candidate has a distinct preference for either of those modes. They recognize the minister, elder, presbyter, or bishop (holding these titles as synonymous) as the only clerical officer of the church. The deacons, though set apart by ordination in some of the churches, have no more authority than any other layman. An executive, or prudential, or standing committee (they are called by these different names in different churches) assist the pastor in examining candidates for membership, and those recommended by them are propounded for membership, and if no exception is taken they are received after a delay of one or two weeks. Pastors are called by the churches which desire their services, and usually also by the ecclesiastical society, the corporation known in law as holding and controlling the church property, and which is usually composed of members of the church; but the pastor is not considered as in the fellowship of the Congregational churches adjacent, until he has been examined, and ordained or installed by a council composed of the pastors and lay delegates from other churches. A church may be organized by a band of believers coming together voluntarily and agreeing to form themselves into a church, but in order to its recognition as in fellowship with other churches of the same faith, a council must be called to examine into the need of it, its material, and its doctrines.

Candidates for the ministry are examined carefully in regard to their religious experience, doctrinal views, knowledge of Scriptural learning, and general fitness. Usually a collegiate education, or its equivalent, is required. The church is practically the

highest authority in regard to matters of discipline, but in important cases at the request of the party under discipline, a mutual, or if the church refuse, an *ex-parte* council of pastors and delegates of neighboring churches, is called, which investigates the case, and communicates the "results" at which it arrives, to the parties. These councils possess, however, only advisory powers, but their advice is usually accepted.

The Congregationalists have now churches in 37 of the states and territories, and while their largest membership is still in New England, in most of the states of that section it being the largest denomination, yet they have very considerable strength in Illinois, Michigan, Iowa, Wisconsin, Ohio, and New York.

Their statistics at the close of 1870, were: Churches 3,121; Ministers 3,194; Members 306,518; teachers and pupils in Sabbath Schools 361,465; gain over the previous year, churches 78; members 6,156; members of Sabbath Schools 4,963; ministers exclusive of foreign missionaries 30. Of the ministers, 928 are reported as not engaged in pastoral work. Of their contributions to benevolent purposes, it is impossible to speak definitely, as they are in the Bible Society, the American Tract Societies, and have been, until the present year, in the American Board, and the American and Foreign Christian Union, associated with other denominations. Their contributions to the several benevolent objects, aside from contributions for home church purposes, and from endowments made to collegiate or Theological institutions or asylums, &c., must have exceeded \$2,000,000. For home purposes they were not less than \$4,500,000 more.

The denomination have six theological seminaries, which had, in 1870, twenty-eight professors, and 305 students. These were located at Bangor, Maine; Andover, Mass.; Hartford and New Haven, Conn.; Oberlin, Ohio; and Chicago, Ill. There were also eighteen colleges, having an aggregate of more than 5,000 students, in which, though not exclusively denominational, the Congregationalists have a controlling influence. Aside from these, there are eighteen incorporated and endowed academies, and female seminaries, besides numerous private seminaries and academies, directly under the control of the denomination.

There are seventeen periodicals, weekly, semi-monthly, monthly, and quarterly, which

are recognized as distinctively Congregationalist.

The only other denominations not already noticed, which are Congregational in their polity, but not in their doctrine, are the UNITARIANS, and UNIVERSALISTS, both of which will be treated under their respective titles.

VI. THE PROTESTANT EPISCOPAL CHURCH IN THE UNITED STATES, sometimes called by a section of its members, the ANGLICAN or ANGLO-CATHOLIC CHURCH.

This denomination was, in its origin in the United States, a part of the Church of England, and its clergymen received ordination at the hands of the Bishop of London until 1784, and indeed most of them until 1788 or 1789. Virginia had established the Church of England as the religion of the colony, as early as 1650, and Maryland, though settled at first by Roman Catholics, had done the same thing in 1692. Attempts were made by some of the colonial governors of New York to make it the established religion of that colony, but without great success. The adherents to the Church of England were, however, considerably numerous in New York, Pennsylvania, Maryland, and Virginia, before the Revolutionary War, and they had ten or twelve churches in Connecticut. In the other colonies they were very few. Efforts had been made to obtain one or two bishops for these colonies almost from the beginning of the eighteenth century, but they had failed, both from the unfriendly feeling of the English government, and from the jealousy against Episcopacy in the colonies, growing out of the political complications in which the bishops in Great Britain were involved. In November, 1784, Rev. Samuel Seabury, D. D., a Connecticut clergyman, having sought ordination as a bishop of the diocese of Connecticut, from the English bishops, and being refused on account of some political obstacles, went to Scotland and was consecrated at Aberdeen, by three of the bishops of the Scottish Episcopal Church. In 1787, William White, D. D., was consecrated Bishop of the Diocese of Pennsylvania, and Samuel Provost, D. D., Bishop of the diocese of New York, by the Archbishop of Canterbury, at Lambeth Palace chapel, and three and a half years later, James Madison, D. D., of Virginia, was consecrated at the same place as Bishop of the

Diocese of Virginia. These four bishops were all who received consecration in Great Britain and through them, according to the views of the High Church party, the Apostolical succession in the bishops and clergy was transmitted to the American church. The growth of the Protestant Episcopal Church has not been rapid, but has been to a great extent in the large cities and principal towns of the country, and only to a limited extent in the rural parishes. The beautiful liturgy and imposing ritual of the Episcopal Church, as well as the wealth and fashion of some of its adherents, and the gorgeous architecture of many of its church edifices, have drawn to its worship, in the great cities, large numbers of the fashionable and worldly, attracted by externals; but within its communion are also very many earnest and devout souls, to whom its order and ceremonies are exceedingly precious. Within its communion, as in that of the Church of England, there are three distinct parties, often more diverse in their views than either is from other denominations; yet all professing to hold by the same standards, to which, however, they give very different interpretations. The doctrinal standards of the Protestant Episcopal Church, are the Apostles' and Nicene creeds (for though many of them agree to the Athanasian Creed, it is not an acknowledged standard as it is with the Church of England); the XXXIX articles of the Church of England, except the XXist and XXXVIIth, and a slight modification of the VIIIth, XXXVth, and XXXVIth; the Book of Common Prayer, as revised by the American Bishops, and the Homilies in general. The *High Church party* (with which are generally included the Ritualists, and the Puseyites or Tractarians, though both go farther than most of the High Churchmen) take their stand upon the Episcopal Constitution, the theory of Apostolical succession, and more than all on the Book of Common Prayer, and give to these standards a significance which seems strained and mystical, and insist that they are to be interpreted with due reference to the practices and customs of the early Catholic Church. They have brought into the worship of the Protestant Episcopal Church many customs, ceremonies, and practices which are certainly borrowed from the Roman Catholic church, and a considerable number of them have demonstrated this, by taking still another step and going entirely over to the Church

of Rome. This branch of the Protestant Episcopal Church, or rather this party in it, have been extremely intolerant of other religious denominations, denouncing them as dissenters, and as having no part in the covenant, assuming to themselves even a higher position than that claimed by the Roman Catholic Church. At the same time, it is due to them to say, that in active Christian work within the bounds of their own denomination, exclusively, they are not surpassed by any other denomination in the country, according to their numbers. Their intolerance and bigotry has possibly led another division of the church, the *Low Church party*, to an extreme in the other direction. The Low Church take their position on the "Thirty nine articles" which are Calvinistic on the doctrine of election, and Zuinglian in the doctrine of the Sacraments. They are Evangelical in their doctrinal views, and interpret their standards as permitting, and indeed enjoining, on them free and hearty Christian intercourse with other Evangelical denominations. They interchange pulpits with them, and engage very cordially in associations for the promotion of objects of general Christian benevolence. That in these measures they occasionally overstep the strict letter of their standards, may be, and probably is, due to a too great narrowness in the standards themselves.

The third, or "*Broad Church party*," have not so much inclination either to a narrow and straight-laced interpretation of their standards, and a bigotry toward other denominations, or to a thoroughly evangelical coöperation with them, as to loose and broad views in regard to the inspiration and authenticity of the Scriptures, and a strongly rationalistic tendency. This party, which we believe includes in this country none of the bishops, subscribe to the XXXIX articles, with many mental reservations, and some of them boldly avow that Protestantism is a failure.

The condition of affairs in the Protestant Episcopal Church, resulting from these great differences of sentiment and opinion, have more than once threatened that church with division, if not dissolution, and at the present time seem more likely to rend it than ever. A few churches have already withdrawn from its communion, and others of the Low Church party are only awaiting the result of a last appeal to the Triennial General Convention to decide upon their future course.

Under the article on the METHODIST EPIS-

EPISCOPAL CHURCH, we have given twenty-five of the thirty-seven articles retained by the Protestant Episcopal Church, in every case but one using their exact language. (This one is in regard to the "Rulers of the United States of America," and, of course, differs from the English article on the subject of rulers.) It is hardly necessary for us to repeat these, and the others which are omitted by the Methodist Church, but retained by the Protestant Episcopal; they relate, as will appear from their titles, rather to abstract topics and beliefs, and to matters of polity, than to the fundamental doctrines of the Church. The titles of the omitted articles are: "Art. 3. Of the going down of Christ into Hell." "Art. 13. Of works before justification." "Art. 15. Of Christ alone without sin." "Art. 17. Of Predestination and Election" (the most decidedly Calvinistic article in the whole XXXIX, and singularly at variance with some other portions of the standard). "Art. 18. Of obtaining salvation only by the name of Christ." "Art. 20. Of the authority of the Church." "Art. 23. Of ministering in the congregation." "Art. 26. Of the unworthiness of the ministers, which hinders not the effect of the sacrament." "Art. 29. Of the wicked which eat not the body of Christ in the use of the Lord's Supper." "Art. 33. Of excommunicated persons; how they are to be avoided." "Art. 34. Of the traditions of the Church." "Art. 36. Of the consecration of Bishops and ministers." This last is modified to adapt it to the peculiarities of the American church. To the doctrinal discrepancies growing out of the interpretations of the XXXIX articles, and the Book of Common Prayer, which it is very difficult to make accord fully with each other, is due much of the division in the Protestant Episcopal Church.

In matters of polity, the Episcopal Church recognizes three orders of clergy: Bishops, priests, and deacons. The Bishops, like those of the Roman Catholic, Greek, Armenian, and some other churches, are *diocesan*, i. e., have charge of the churches of a particular territory or diocese, in distinction from those of the Methodist Church, which are general and itinerant, and those of a part of the Lutheran churches, which are more nearly Presbyterian, the Bishop being of no higher authority nor dignity than the other clergy, but simply performing duties of a different class. Such is substantially also the theory of Episcopacy in the Moravian church.

The High Church theory is, that the Bishops are the successors of the Apostles, that the consecration has come to them in regular order through the hands of a succession of holy men, the bishops of the Roman Church before the Reformation, and that they are thus Bishops by direct transmission from Jesus Christ and his Apostles, and so by divine right. They regard them as superior to priests and deacons. The Low Church party deny all this, and reject the theory of the "exclusive validity of Episcopal orders." The priests, called also in the United States, generally rectors, and, where not in full charge of a parish, assistant ministers, have received at the hands of the bishop the second ordination which confers upon them the power of administering the sacraments. The third, or lowest grade of the ministry, is the deacon, which in this church is usually but temporary, the candidate when invested with this office, is allowed to baptize, to read in the church, and to assist in the Eucharist, but only in the administration of the wine. His office is wholly distinct from that of the deacon in Presbyterian, Congregational, or Baptist churches, being more analogous to that of the licentiate in those churches. It is usually a mere preliminary or stepping stone to the reception of priests' orders, and both ordinations are, in some instances, effected in the same day. The temporalities of the Episcopal churches are administered by the concurrence of the rector and the vestry, composed of wardens and vestrymen elected by the members of the parish. The Episcopal Church usually administers baptism by making the sign of the cross on the forehead of the person baptized, requiring a profession of faith (in the case of infants, this is made for them by their sponsors, or god-father and god-mother). Immersion either in the case of children or adults, though formerly practised by the Church of England, is not now considered necessary. The formula for the baptism of infants, in the prayer book, contains the words, "since this child is now regenerate," and a very exciting discussion has sprung up in regard to these words, some clergymen contending that they inculcated the doctrine of baptismal regeneration, and refusing to use them on this account. At the Triennial General Convention, held in Baltimore, in Oct. 1871, though no general canon defining this passage was passed, yet nearly all the bishops signed a paper giving it as their private opinion that the term as

thus used was not intended to imply that doctrine.

The statistics of the Protestant Episcopal Church in 1870 were as follows: Dioceses 39; Missionary do. 11; Bishops 39; Assistant do. 5; Missionary do. 8; Priests and Deacons 2,710; Parishes 2,512; communicants, not fully reported, but believed to be not quite 220,000; Baptisms of infants, 20,749; of adults, 5,030; not specified, 3,760; Confirmations 20,793; Sunday School Teachers 18,664; Scholars 185,979; Contributions (incomplete), \$4,205,029.

The Episcopal Church has been very active in the promotion of educational institutions. It has 14 theological seminaries, with 57 professors and 366 students; 15 colleges, with 1,380 students, and 20 academies and diocesan schools, under the control of its Bishops. It has 22 periodicals, weekly, semi-weekly, monthly, and quarterly, devoted to its interests, and within a few years past has manifested a zeal and energy in propagating its views, and establishing churches, especially in the new states and territories, which contrasts very favorably with the apathy of its early history.

VII. THE EVANGELICAL LUTHERAN CHURCH.

The Lutheran Church in the United States, is one, in the sense of holding with greater or less tenacity to the same standards or Confessions of Faith; but it has some elements of discord in it, mainly in matters of minor importance, which have led to violent controversies, and to so great bitterness between some of its synods that they not only refuse fellowship and communion with each other, but have excommunicated each other. These discordant elements are, however, confined for the most part to the smaller independent synods, and do not so much affect the larger bodies. The denomination is growing in the United States with great rapidity, especially in the West, and mainly, though not exclusively, by immigration, the very large numbers of Germans, Swedes, Norwegians, and Danes, arriving here every year being, a majority of them—nominally at least—attached to the Lutheran faith. The first Lutherans came to Pennsylvania between 1680 and 1700, attracted by the offers of William Penn. In 1710, about 3,000 German Lutherans who had taken refuge in England from the persecu-

tions of the Romanists, were sent over to Pennsylvania by the British government. In 1727, another large colony came over from the Palatinate, Wurtemberg, Darmstadt, and other parts of Germany. For nearly twenty years, these poor people had no ministers of their own; but in 1748, Dr. Henry Melchior Muhlenburg, a missionary of the Halle Orphan House, brought up under the training of Francke and Spencer, came to Pennsylvania and labored most zealously for half a century among them, organizing churches, consistories, and synods, and being entitled to be considered the father of the German Lutheran Church in America. At the time he arrived here, there were only eleven Lutheran ministers in the Colonies. Three years later there were forty, and a Lutheran population of about 60,000. No one of the Protestant churches suffered more severely by the Revolutionary War than did the Lutheran, and they were long in recovering from the depression thus caused. Many of their churches were abandoned, and it seemed for years as if their religious vitality had departed. Their churches were scattered, and belonged to distant and separate synods, having little communication with each other and no common band of union, and being in many instances composed of Lutherans from different countries of Europe, they were inclined to look upon each other with jealousy. This was, to some extent, remedied, and a better state of affairs inaugurated by the formation of the General Synod of the Lutheran Church, in 1820. From that time, a steady and constantly increasing tide of emigration began to flow in to the country, and much of the German and Scandinavian part of it was composed of Lutherans, or those who had been brought up under Lutheran influences. Many of these, coming from countries where Lutheranism was the religion of the state, and the sovereign the head of the church, had been accustomed to great laxity in religious matters. At the suitable age they were confirmed and became members of the church, however irregular their mode of life, and no evidence of conversion was required for membership. These lax views, and a general tendency to rationalism, they desired to graft upon the American Lutheran Church, and in some of the newer synods their views prevailed. These synods refused, on these and other accounts, to join the General Synod. There were other grounds of difference, also, relating to

the standards of the church, the clerical office, the adoption or rejection of symbolical rites and ceremonies, and a liturgical service, and the making use of what have been known as revival measures. These differences were increased by the emigration of a considerable number of the "Old Lutheran" party to the United States in 1837 and 1838. The Lutherans all agree in receiving the "Augsburg Confession," (drawn up by Melancthon, and sanctioned by Luther, in 1530) as their principal standard of doctrine; though the New Lutherans regard even this as only an expression, "in a manner substantially correct," of the cardinal doctrines of the Bible, which they regard as the only infallible rule of faith and practice. The Old Lutherans on the contrary, while avowing the Bible as the ultimate rule of faith and practice, adhere very strenuously to the entire "Book of Concord," so called, as the standard of their doctrinal beliefs. This Book of Concord contains the three creeds, viz., the Apostles', Athanasian, and Nicene Creeds, the Augsburg Confession of 1530, and the Apology of the Confession (written by Melancthon, 1540), the Schmalkald Articles (drawn up by Luther in 1537), and the two Catechisms of Luther (prepared before 1530). The Old Lutherans are inclined, to some extent, to retain also, those rites, ceremonies, and observances, which Melancthon regarded as things indifferent, such as the wearing of clerical vestments, exorcism, private confessions, lax views of the Sabbath, and the old Lutheran doctrine of baptism, in its relation to regeneration and the Lord's Supper.

"The book of Concord," and, indeed, the "Augsburg Confession," and its "Apology," are too long to be inserted in this brief history of denominations, but we give below a summary of their principal doctrines, as stated by an eminent Lutheran clergyman.* "The fundamental doctrine of the Lutheran Church is that we are justified before God, not through any merit of our own, but by his tender mercy, through faith in his Son. The depravity of man is total in its extent, and his will has no positive ability in the work of salvation, but has the negative ability of ceasing its resistance. Jesus Christ offered a proper and vicarious sacrifice. Faith in Christ presupposes a true penitence. The renewed man co-works with the Spirit of

God. Sanctification is progressive and never reaches absolute perfection in this life. The Holy Spirit works through the Word and the Sacraments, which alone, in the proper sense, are means of grace. Both the Word and the Sacraments bring a positive grace which is offered to all who receive them outwardly, and which is actually imparted to all who have faith to embrace it.

. . . . The Evangelical Lutheran Church regards the Word of God, the Canonical Scriptures, as the absolute and only law of faith, and of life. Whatever is undefined by its letter or its spirit, is the subject of Christian liberty, and pertains not to the sphere of conscience, but to that of order; no power may enjoin upon the church, as necessary, what God has forbidden, or has passed by in silence, as none may forbid her to hold what God has enjoined upon her, or to practise what, by His silence, he has left to her freedom. Just as firmly as she holds upon the one hand that the Bible is the rule of faith and not a confession of it, she holds on the other that the creed is a confession of faith and not the rule of it. The creeds are simply the testimony of the Church to the truths she holds; but as it is the truth they confess, she of necessity regards those who reject the truth confessed in the creed, as rejecting the truth set forth in the Word. While, therefore, it is as true of the Lutheran Church as of any other, that when she lays her hand upon the Bible, she gives the command, 'Believe!' and when she lays it on the Confession, she puts the question, 'Do you believe?' it is also true that when a man replies, 'No,' to the question, she considers him as thereby giving evidence that he has not obeyed the command. *Baptism.* The Lutheran Church holds that it is necessary to salvation to be born again of water, and the Spirit; but she holds that this necessity is ordinary, not absolute, or without exception; that the contempt of the sacrament, not the want of it, condemns, and that though God binds us to the means, He does not bind His own mercy by them. From the time of Luther to the present hour the Lutheran theologians have maintained the salvability and actual salvation of infants dying unbaptized. The rest of the doctrine of the Lutheran Church as a whole, is involved in her confession, with the Nicene Creed, "one baptism for the remission of sin," and that through it the grace of God is offered; that children are to be baptized, and that being

* New American Cyclopædia, Vol. X, pp. 739, 740.

thus committed to God they are graciously received by him. At the same time she rejects the theory of the Anabaptists, that infants unbaptized have salvation because of their personal innocence, and maintains that the nature with which we are born requires a change, which must be wrought before we can enter heaven, and that infants are saved by the application of Christ's redemptory work." It has been charged for more than three centuries that the Lutherans held to the doctrine of *Consubstantiation*, that is, the local or corporeal presence in, with, or under the bread in the Lord's Supper; they deny this most strenuously, but admit that they hold to a sacramental, spiritual, or supernatural presence of the Divine Redeemer in the sacrament, and that those who partake, do in reality feed upon him spiritually, though if unworthy, to their own condemnation. On the subject of the Lord's Day, while it is acknowledged that the general practice among Protestants on the continent of Europe, in regard to its observance, is much more lax than that which prevails in England and the United States, yet the American Lutheran Church profess to hold that the Sabbath was instituted at the creation of man; that the generic idea of devoting one day of the week to rest from labor, and to religious duties, pertains to the entire race through all time; and that the law of the Sabbath, so far as it is not determinative and typical, is binding on Christians.

"*Divine Worship.* The Lutheran Church regards preaching as an indispensable part of divine service. All worship is to be in the vernacular; the wants of the heart as well as of the reason are to be met. Whatever of the past is spiritual, beautiful, and appropriate, is to be retained. The Church year, with its great festivals, is kept. With various national diversities, there is a substantial agreement in the liturgical services of the Lutheran Church, throughout almost all the world. The hymns are sung by all the people, with the organ accompaniment." The hymnology of the Lutheran Church surpasses that of all other churches in the world in sweetness, richness, power, and unction. Even in their English dress there are few hymns more beautiful or soul-inspiring than Luther's "A strong fortress is our God," or "O! Head, so bruised and wounded," or "Jerusalem, the Golden."

"The clergymen in their official functions, wear a distinctive dress, usually a black robe,

with the bands. A preparatory service precedes communion. The doctrine and practice of auricular confession were rejected in the beginning. The "private confession," which was established in some parts of the Church, involves no enumeration or confession of particular sins whatever, unless the communicant desires to speak of them; and the "private absolution" is simply the announcement of the gospel promise, with the gospel conditions to the individual penitent. But even in this form, private confession has ceased in most parts of the church. The practice of exorcism in baptism, simply as a rite long established, and which might be tolerated if regarded merely as a symbolical representation of the doctrine that our nature is under the dominion of sin, was practised in parts of the church, but has fallen almost everywhere into oblivion.

Constitution or Polity of the Church. "Many embarrassing circumstances prevented the Lutheran Church from developing her life as perfectly in her church constitution, as in her doctrines and worship. The idea of the universal priesthood of all believers, at once overthrew the doctrine of a distinction of essence between clergy and laity. (This doctrine is, nevertheless, maintained in one or two of the American synods.—*Editor.*) The ministry is not an order, but it is a divinely appointed office, to which men must be rightly called. No imparity exists by divine right; a hierarchical organization is unchristian, but a gradation (bishops, superintendents, provosts,) may be observed, as a thing of human right only. (In the United States, the Lutheran Church has no bishops, superintendents, or provosts.—*Editor.*) The government by consistories has been very general. In Denmark, Evangelical bishops took the place of Roman Catholic prelates who were deposed. In Sweden, the bishops embraced the Reformation, and thus secured in that country an "apostolic succession," in the High Church sense; though, on the principles of the Lutheran Church, alike where she has, as where she has not such a succession, it is not regarded as essential even to the order of the church. The ultimate source of power is in the congregation, that is, in the pastor and other officers of the church, and the people of the single communions. The right to choose a pastor belongs to the people, who may exercise it by direct vote, or delegate it to their representatives. Synods possess

such power as the congregations delegate to them. "Ministers are related to congregations, not as their servants, but as the servants of the church, and in the United States where the Congregational principle has been more radically developed than anywhere else in the Lutheran Church, "the Synod to which pastors belong has the entire jurisdiction over them." (See Formula of the Lutheran Church, Chap. iii, 3.) Absolute ministerial parity is maintained, and lay representation is universal; but many vital points of church organizations are entirely unsettled, and the doctrine that synods are merely advisory bodies," is often pressed in a way that tends to anarchy.

The Lutheran Church in the United States is divided into the following organizations: 1st, THE GENERAL SYNOD, founded in 1820, and comprising in 1870, twenty Synods, viz: the Synods of Maryland, West Pennsylvania, Hartwick, East Ohio, Frankean, Alleghany, East Pennsylvania, Miami, Wittenberg, Olive, Northern Illinois, Southern Illinois, Central Pennsylvania, English Synod of Iowa, Northern Indiana, New Jersey, Central Illinois, New York, Susquehanna, Pittsburgh, and Kansas. The General Synod recognizes the Augsburg Confession, but allows considerable liberty of doctrinal views in its interpretation. It formerly had more synods connected with it, but six southern synods, subsequently increased to seven, seceded during the war and formed the SOUTHERN GENERAL SYNOD. Their action was based on the resolutions of loyalty to the Government expressed by the General Synod, but they are said to have adhered more closely to the standards, and to have been more strict in regard to the qualifications of membership than the Old Synod. The Northern General Synod had, in 1870, 627 ministers, 1,067 churches, and 103,042 communicants. The Southern General Synod, organized in 1862, had at the same time: 126 ministers, 225 churches, and 20,796 communicants.

A much younger body, and yet having a larger membership, is the GENERAL COUNCIL, organized in 1867. The General Council adheres to the entire body of standards contained in the "Book of Concord," which they declare to be accepted by them as being in full accord with the Scriptures. It comprises twelve Synods, viz: The New York Ministerium, the Synod of Pennsylvania, a Pittsburgh Synod, the English District

Synod of Ohio, the English Synod of Ohio, the Synod of Illinois, the Synod of Michigan, the German Synod of Iowa, the Synod of Minnesota, the Scandinavian Augustana Synod, the Synod of Texas, and the Synod of Canada. These Synods had in 1870, 535 ministers, 986 churches, and 131,632 members.

Six other Synods, viz: Missouri, Ohio, Wisconsin, the Norwegian, Graba's-Buffalo Synod, and the German Synod of New York, agree very fully in doctrines with each other, except that the last two named have some peculiar views in regard to the status of the Christian ministry. They differ from the General Council in these four points: they desire to prohibit an interchange of pulpits with all other denominations, and admission to the Lord's Supper; they condemn Millenarianism, and excommunicate from their fellowship all members of secret societies. Their numbers, in 1870, were as follows: ministers, 650; churches, 965; communicants, 150,925. These synods will probably soon be united in one organization.

The following synods, all small, are still independent, but will probably soon be connected with some one of the larger bodies: The Tennessee, Von Rohr's Buffalo Synod, the Concordia, Eielson's Scandinavian Synod, and the Norwegian Danish Conference. These synods had in 1870, 70 ministers, 218 churches, 18,327 members. There were, besides, 30 ministers whose synodal connection was unascertained. There were, therefore, in 1870, connected with the different councils, synods, and conferences of the Lutheran Church in the United States, 53 synods, 2,086 ministers, 3,544 churches, and 425,577 communicants. The other statistics of the Church are partial, and not later than 1869. The General Synod had in that year, 81,445 teachers and scholars in its Sabbath Schools, and contributed to benevolent objects \$340,133. The contributions of the other branches of the church are not reported.

Thirty-two Lutheran newspapers were published in 1870, viz: Eight English, sixteen German, two Swedish, and six Norwegian and Danish. There are two Lutheran Church Almanacs published annually, one at Baltimore, the other at Allentown, Pa. There are 15 Theological seminaries for Lutheran students, with about 60 professors, and 450 students, and 17 colleges with more than 2,000 students. There are also 18 sem-

maries or academies of high grade under their control.

VIII THE SOCIETY OF FRIENDS OR QUAKERS.

I. THE ORIGINAL OR ORTHODOX FRIENDS. The Society of Friends originated in the early part of the seventeenth century, in Great Britain, as one of those protests against formalism and Christianity from which the heart and life had died out, which have in all ages demonstrated the power of religious principle to react from the deadness of state churches. George Fox, its founder, commenced proclaiming the doctrines of the power of Christ to save men from sin, and the influence of the Holy Spirit in changing and transforming the evil nature, when he was but twenty three years of age, and continued it for forty years, until his death. His followers were not very numerous, but they were exceedingly earnest, stern in their adherence to what they believed to be the monitions of the Holy Spirit, and when persecuted, took joyfully the spoiling of their goods, and went to prison, to the stake, or to the gallows with a calm fearlessness which convinced many of the truth of their doctrines. It was not in England alone that they were thus persecuted. In July, 1656, two female members of the Society of Friends reached the port of Boston, but were compelled by the colonial government to return in the same ship. Others, however, followed soon after, and while their conscientious protest against the prevalent customs and manners may have savored of fanaticism, the colonial authorities were certainly in the wrong in persecuting them so bitterly. They were whipped, imprisoned, and banished from the Massachusetts Colony, and four out of five who ventured to return from banishment, one of them a woman of remarkable gifts and devotion, were hanged for their contempt of the colonial laws. The last martyr of the Society of Friends in America was executed in 1661, but subsequent to that date some were whipped, banished, and imprisoned, in the colonies of Massachusetts and Connecticut. In 1682, a considerable number of Friends came over to Pennsylvania with William Penn, himself a member of the Society. Fox had himself visited America in 1669, and remained till 1673, and had established meetings of Friends in North Carolina and elsewhere, some of which

are still in existence. The Society of Friends in America adheres, to this day, to the organization devised for it by Fox. Their meetings, as they call their congregations, are presided over by Elders, and these the most prudent and judicious men of these congregations, exercise a quiet, but effective, supervision over those who believe themselves called of God to proclaim his truth. The utterances of this truth made as the result of a special impulse or call of the Spirit then and there to speak, are made by both sexes, the doctrine of the Friends on this subject being, that God calls both men and women to utter his truths. The meetings are subject to monthly meetings of the different congregations of a neighborhood or district, and these to the "Yearly Meetings," which are diocesan in their character, and have a controlling and disciplinary power. These Yearly Meetings, of which there are ten or more, are equal in their authority, and there is no appeal from their decisions.

At the time of the commencement of the Revolutionary War, there were about 45,000 Friends in the thirteen colonies, and as they were opposed to bearing arms, and utterly refused to take part in the War, there was at first some apprehension that they were hostile to the patriot side. This impression was soon dissipated; for though, with some few exceptions, the members of the society did not bear arms, they rendered great and conspicuous service to the national cause, and this service was rendered with such sacrifices and with so much liberality as to show that their hearts were in the cause, though they were conscientiously opposed to fighting. For two or three decades after the war, they continued to increase, though not very rapidly. Then came a season of stagnation. They, who, in the beginning of their history, had been the most radical of radicals, were now intensely conservative; and while as holy men and women as ever walked the earth shaded their brows beneath broad brimmed hats and Quaker bonnets, and adhered strictly to the Quaker dress, there had come over the society a spirit of formalism, which occupied itself too much in the petty details of dress and language, and neglected, to some extent, the weightier matters of law, judgment, and faith. Their services had become distasteful to many of their young people, and these were abandoning the faith of their fathers and going to the opposite extreme of Ritualistic observance in the Episcopal Church, or,

in still stronger protest against its stringent rules of life, became the most worldly of worldlings, till it became a byword in regard to the fastest of fast young men, "They were brought up as Quakers! Meanwhile, there was in the meetings themselves a gradual drawing away from the soundness of their pristine faith. There were not, as of old, those fervent, earnest testimonies; the Spirit's power of impressing men and women to utter the word of exhortation came to be less frequently and less decidedly manifested than of old, and ever and anon there were those mute, but protracted, assemblies which bore witness more powerfully than any prophetic utterance could have done, that it was not with them as in days past, when the candle of the Lord shined around about them. In 1827 came the great secession, when almost one-third of their number repudiated the claims of Christ, as the God-man, the Divine Redeemer, and, while still claiming to be "Friends," withdrew with their leader and formed a new organization. For more than twenty years that followed, the 'Friends' of the Orthodox faith still walked in the wilderness, amid clouds and darkness; still their sons and daughters fell away to the world, and their numbers decreased or remained stationary.

But at length the time of refreshing came, and as the testimonies to God's goodness and grace multiplied, and their meetings were no longer silent and dreary as of old, they began to extend their influence, and to find in active work for Christ, in the First Day Schools, in the distribution of the Word of God, in labors for the poor, oppressed, and down trodden, the true secret of success. Since 1850, their numbers have nearly doubled, and in the work of religious instruction, and vigorous efforts for the conversion of men, they have found such blessings that they have become an aggressive, earnest, and efficient body of Christian men and women.

"The Society of Friends," says Mr. William J. Allinson, editor of *The Friends' Review*, "is not at issue with other Orthodox churches on the general points of Christian doctrine. Avoiding the use of the word Trinity, they reverently believe in the Holy Three: the Father, the Lord Jesus Christ, the only begotten of the Father, by whom are all things, who is the Mediator between God and man, and in the Holy Spirit, who proceedeth from the Father and Son—ONE God, blessed forever. They accept, in its

fullness, the testimony of Holy Scripture with regard to the nature and offices of Christ, as the promised Messiah, the Word made flesh, the atonement for sin, the Saviour and Redeemer of the world. They have no reliance upon any other name, no hope of salvation that is not based upon his meritorious death on the cross. As fully do they admit his humanity, and that he was truly man, "sin only excepted." They so fully believe in the Holy Spirit of Christ, that without the inward revelation thereof they feel that they can do nothing to God's glory, or to further the salvation of their own souls. Without the influence thereof they know not how to approach the Father, through the Son, nor what to pray for as they ought. Their whole code of belief calls for the entire surrender of the natural will to the guidance of the pure, unerring Spirit, through whose renewed assistance they are enabled to bring forth fruits unto holiness, and to stand perfect in their present work. As it was the design of Christ in going to the Father, to send, as a Comforter, his Spirit to his disciples, so it is with his Spirit that he baptized and doth baptize them, it being impossible, in the estimation of the Friends, that an outward ablution should wash from the spirit of man the stains of sin. Hence they attach importance to "the baptism which now saveth," and which John the Baptist predicted should be administered by Christ. And it is by his Spirit, also, that his followers are enabled to partake of the true Supper of the Lord: "Behold I stand at the door and knock: if any man hear my voice, and open unto me, I will come in and sup with him, and he shall sup with me." Thus they hold that the coming of the Lord Jesus Christ in the flesh was the grand epoch and central fact of time, and that types and shadows, and all ceremonial observances, which had their place before, as shadows of good things to come, now that they have been fulfilled in Him, are only shadows of those shadows. The type properly precedes the reality, and truly this was worthy of being fore-shadowed; "but," says Paul, "when that which is perfect is come, that which is in part shall be done away."

In regard to their views of the resurrection, Thomas Evans, another of their leading writers, says: "The Society of Friends, believes that there will be a resurrection both of the righteous and the wicked; the one to eternal life and blessedness, and

the other to everlasting misery and torment, agreeably to Matt. XXV, 31-45; John V, 25-30; 1 Cor. XV, 12-58. That God will judge the world by that man whom he hath ordained, even Christ Jesus the Lord, who will render unto every man according to his works; to them who by patient continuing in well doing during this life, seek for glory and honor, immortality and eternal life; but unto the contentious and disobedient, who obey not the truth, but obey unrighteousness, indignation and wrath, tribulation and anguish, upon every soul of man that sinneth, for God is no respecter of persons."

The Friends have ever regarded war as inconsistent with Christianity. For this they refer to the teachings of Christ and his apostles, the example of the early Christians, and to the witness for truth in their own consciences, tested and confirmed by the sacred writings. They find that all the emotions which are exercised in wars and fightings are traced to evil lusts, and are inconsistent with love which is the substance of the first, the second, and the new commandment, which "worketh no ill to his neighbor," and on which "hang all the law and the prophets." They consider oaths to be inadmissible, as being positively forbidden by our Lord in language not to be mistaken, and this testimony was made the occasion of inflicting severe penalties upon the first Friends. When their persecutors failed to convict them upon false charges, it was customary to administer the test oaths to them, on refusing to take which, they were cast into prison.

They decline to use the complimentary and false language of the world, and to apply to the months and days, the names given in honor of pagan gods, preferring the numerical nomenclature adopted in the Scriptures. In dress, they aim at plainness and simplicity, avoiding the tyranny of an ever-changing fashion. As a natural result, a degree of uniformity of dress prevails among them, bearing much resemblance to the style in vogue at the rise of the Society. This approach to uniformity, which at first was unintentional, came to be cherished as a hedge of defense against worldly and ensnaring associations, and a means by which they recognized each other. The principle at stake is not in the fashion of a garb, but in simplicity and the avoidance of changes of fashion. Whilst Friends, as good citizens, have cheerfully paid all legal assessments for the support of public schools, and of the poor, and

have contributed abundantly to the various charities, and general claims of benevolence, they have always been characterized by their scrupulous care in relieving their own poor, so that none of their members come upon the public for maintenance or gratuitous education.

The Friends had, in 1870, including one in Canada, ten Yearly Meetings in North America, namely, those of Canada, New England, New York, Philadelphia, Baltimore, North Carolina, Ohio, Indiana, Western Indiana, and Iowa. The increase of membership in the Western States has been very rapid of late years. The membership of the Society is estimated at 80,000. In all the Yearly Meetings, First Day Schools are conducted with zeal and efficiency. The number of teachers and scholars in these First Day Schools is about 65,000. The North Carolina Yearly Meeting has established a Normal First Day School, for the training of teachers of these Schools. They have three colleges, all of them of high character for their thorough scholarship, viz.: Haverford College, in Philadelphia county, Penn.; Earlham College, Richmond, Indiana, and Whittier College, Salem, Iowa. They have, also, large and admirably conducted boarding schools, under the care of their Yearly Meetings, at West Town, Pa., Providence, R. I., Union Springs, N. Y., and New Garden, N. C. They have two or three periodicals of marked ability, *The Friends' Review*, conducted by Mr. Allinson, being in literary merit not inferior to any religious review in this country.

II. THE SOCIETY OF FRIENDS (SECESSIONS OR HICKSITES). We have already referred to the schism or secession which took place from the Society of Friends, beginning with the Philadelphia Yearly Meeting, in 1827. This secession was led by a preacher among the Friends, named Elias Hicks, and hence those who have followed his leading are commonly called Hicksites, though they repudiate the name and insist that they should be known solely as the Society of Friends. The points of difference between them and the Orthodox Friends seem to have been these: Hicks and his followers, while maintaining a belief in the authenticity and divine authority of the Scriptures, yet do not regard them with the same degree of reverence and faith as the Orthodox. In their authorized summaries of Christian doctrine and the "advices of their Yearly Meetings,"

they say: "We acknowledge them to be the only fit outward test of Christian doctrines.

We do not call them the Word of God, because this appellation is applied by the writers of the Scriptures to that Eternal Power by which the worlds were made. . . .

We assign to the Scriptures all the authority they claim for themselves. . . .

In these invaluable writings we find the only authentic record of the early history of our race, the purest strains of devotional poetry, and the sublime discourses of the Son of God. Their frequent perusal was therefore especially urged upon our younger members, who were encouraged to seek for the guidance of divine grace, by which alone we realize in our experience the saving truths they contain. . . . We believe it not the part of true wisdom to dwell upon defects, whether real or imaginary, in the sacred records, but rather to use them as they were intended, 'for reproof, for correction, for instruction in righteousness,' remembering that it is only through the operations of the Spirit, of Faith upon our hearts, that they can be made availing to us in the promotion of our salvation."

In regard to the original and present state of man, they differ somewhat from the Orthodox, as the following extracts show: "It is a scriptural doctrine that neither righteousness nor unrighteousness can be transmitted by inheritance, but every man shall be judged according to his deeds. . . . Animal propensities may be transmitted from parents to children, but the Scriptures do not teach that we inherit any *guilt* from Adam, or from any of our ancestors; nor do we feel any compunction for their sins. The language of our Saviour clearly implies that little children are innocent: "for of such," he says, "is the kingdom of heaven."

The followers of Hicks are generally considered Unitarians or Socinians, and yet, while they apparently do not regard Christ as the Second Person in the Divine Trinity, nor attribute a saving efficacy to his death and sufferings, we are inclined to the belief that there is a considerable variety in the views of the individual members of the Society, and, perhaps, even among their leading or representative men on this point. Their "summaries," and "advices" are exceedingly vague, and sometimes conflicting, on these points. The Rules of Discipline of the Philadelphia Yearly Meeting, say: "If any in membership with us shall blaspheme, or

speak profanely of Almighty God, Christ Jesus or the Holy Spirit, he or she ought early to be tenderly treated with, for their instruction, and the announcement of their understanding, that they may experience repentance and forgiveness; but should any, notwithstanding this brotherly labor, persist in their error, or deny the divinity of our Lord and Saviour, Jesus Christ, the immediate revelation of the Holy Spirit, or the authenticity of the Scriptures, as it is manifest they are not one in the faith with us, the monthly meeting where the party belongs, having extended due care for the help and benefit of the individual without effect, ought to declare the same, and issue their testimony accordingly." Samuel M. Janney, author of the "History of Friends," and one of the leading writers of the Seceding party, thus defines their views in regard to Christ: "The most full and glorious manifestation of the divine Word, or Logos, was in Jesus Christ, the immaculate Son of God, who was miraculously conceived and born of a Virgin. In him, the manhood, or Son of Man was entirely subject to the divinity. The Word took flesh, or was manifested in the flesh. . . .

The holy manhood of Christ, that is, the soul of him in whom the Holy Spirit dwelt without measure, is now, and a ways will be, the head or chief member of that spiritual body which is made up of the faithful servants of God, of all ages and nations. 'There is one God, and one Mediator between God and man, the man Christ Jesus.' As Moses was a mediator to ordain the legal dispensation, so Jesus Christ was, and is, the Mediator of the New Covenant; first, to proclaim and exemplify it in the day of his outward advent, and secondly, through all time, in the ministrations of his Spirit. . . .

The great object of the Messiah's advent, is thus declared by himself: "To this end was I born, and for this cause came I into the world, that I should bear witness unto the truth. Every one that is of the truth, heareth my voice." He could not bear witness to the truth, among that corrupt and perverse people, without suffering for it. He foresaw that they would put him to death, and he went forward calmly doing his Father's will, leading a life of self sacrifice, wounded for the transgressions of the people, baptized spiritually in suffering for them, and then finally enduring, on the cross, the agonies of a lingering death, thus sealing his testimony with his blood. His obedience in

drinking the cup of suffering was acceptable to God, for 'he hath loved us, and hath given himself for us, an offering and a sacrifice to God, for a sweet smelling savor.' It was to reconcile man to God, by removing the enmity from man's heart, that Jesus Christ lived, and taught, and suffered, and for this purpose the Spirit of Christ is still manifested as a Redeemer from the bondage of corruption. . . . It is the life of God, or spirit of Truth revealed in the soul, which purifies and saves from sin. This life is sometimes spoken of as the blood: for according to the Mosaic law, '*the blood is the life.*' And when Jesus told the people, 'except ye eat the flesh of the Son of Man, and drink his blood ye have no life in you,' he alluded to the life and power of God that dwelt in him, and spake through him." How far the views thus stated agree with those generally held by the followers of Elias Hicks, we cannot say. They would seem to stamp Mr. Janney and his fellow believers as sympathizing with what is sometimes called the Evangelical wing of the Unitarians. In their other views, the Seceders do not differ materially from the Orthodox Friends. They have been, for some years past, quite active in humanitarian enterprises, being strongly anti-slavery, and having been active in the promotion of asylums and hospitals for the insane, the inebriate, the idiot, and for orphans, blind persons, and the aged and infirm. They had in 1870, six Yearly Meetings, and an estimated membership of between 35,000 and 40,000. They have not done much in the way of establishing First Day Schools, but their boarding and high schools in New York, Philadelphia, Baltimore, and Richmond, Indiana, as well as their smaller schools, are of very high character. Swarthmore College, 8 miles S. W. of Philadelphia, is a well endowed and admirably managed institution, designed for 300 pupils, of both sexes. They have two or three well conducted periodicals.

III. PROGRESSIVE FRIENDS. This is a religious society, organized in 1853, at Chester, Penn., in part as a result of a division in the Kennett Monthly Meeting, of (Hicksite) Friends. The division was caused by a difference of opinion among the members of that meeting, in regard to the propriety of activity in measures of reform. It was organized as the Pennsylvania Yearly Meeting of Progressive Friends, and not long after other organizations in New York and Ohio, having similar objects in view, as well as

individuals from New England, New York and the Western States, who sympathized with it, gradually drifted into a similar organization so far as to attend its Yearly Meetings. Mr. Oliver Johnson, formerly of the *National Anti-Slavery Standard*, and the *Independent*, who has been long identified with this movement, thus defines its character and principles: "The new Society opened its doors to all who recognize the equal brotherhood of the human family, without regard to sex, color, or condition, and who acknowledged the duty of defining and illustrating their faith in God, not by assent to a creed, but by lives of personal purity, and works of beneficence and charity. It disavowed any intention or expectation of binding its members together by agreement as to theological opinions, and declared that it would seek its bond of union in 'identity of object, oneness of spirit in respect to the practical duties of life, the communion of soul with soul in a common love of the beautiful and true, and a common aspiration after moral excellence.' It disclaimed all disciplinary authority, whether over individual members or local associations; it set forth no forms or ceremonies, and made no provision for the ministry, as an order distinguished from the laity; it set its face against every form of ecclesiasticism, and denounced as the acme of superstitious imposture, the claim of churches to hold an organic relation to God, and to speak by his authority, maintaining that such bodies are purely human, the repositories of no power save that rightly conferred upon them by the individuals of whom they are composed." With so radical a platform, it is not a matter of surprise that the yearly gatherings of this Society have drawn together ultraists of all shades, the "come outers" of thirty years ago, Spiritualists, the advocates of female suffrage, and of all manner of practicable and impracticable reforms, and that while, in the company, were many men of lofty purpose and the true martyr spirit, there were others whose whole lives had been devoted to wild and fanatical theories in religions, politics, and social life. Generally these gatherings have been largely attended, but except a single local association at Longwood, near Hamorton, Penn., which have kept up for several years, a meeting on every First Day, and a First Day School for children, and discuss freely questions of ethics, political economy, and religion at their meetings, but have never employed any religious

teacher. It is obviously impossible to give any estimate of the number of Progressive Friends, as their meetings are open to all who choose to come, and there is no enrollment of membership.

IV. We are inclined to place under this general head, also, the SHAKERS, or as they style themselves, the UNITED SOCIETY OF BELIEVERS IN CHRIST'S SECOND APPEARING, not because there is much in common to them and the *Society of Friends* now, but because in their origin they were members of that Society, and because their views of the influence, and inward teachings of the Holy Spirit, though carried to excess, have the same original basis. Attempts have been made to trace their principles back to the *Camisards* or French prophets, and to the school of the prophets in Dauphiny (1688-1705), but these are so evidently an afterthought, as to be unworthy of notice. About 1747, some members of the Society of Friends in the vicinity of Manchester, England, formed themselves into a distinct organization, of which James Wardley and Jane, his wife, were the leaders, and a Mr. and Mrs. Lee were members. Ann Lee, a daughter of the last named couple, born in 1736, and always seriously inclined, had married, in 1756, Abraham Stanley, and in 1758, she, with her husband, joined the association. The religious exercises of this little coterie differed but slightly from those of the other associations of Friends at that time. They were noticeable for greater and more decided physical manifestations than most, such as dancing, shouting, trembling, speaking with tongues, but these were common in that day, and it was only when the excitement was so great as to lead the magistrates and others to charge them with breaking the Sabbath, that the Wardleys, and Ann Lee and her family were fined and imprisoned. In 1770, Ann Lee, then 34 years of age, and to all appearance a woman of no extraordinary talents or education, professed to have received, by a special manifestation of divine light, those revelations which made her the founder of a new faith, and have caused her followers ever since to regard her as an inspired being, and to give her the name of Mother Ann.

In 1774, Mother Ann, and nine of the more prominent members of the Society, under authority of a special revelation, emigrated to America, and 8 of the number proceeding up the Hudson, settled at Niskayuna

(now Watervliet), seven miles from Albany, N. Y., a region then a wilderness. Here they remained for three or four years without any excitement, or considerable increase of their numbers. In 1779, a religious revival occurred at New Lebanon, Columbia Co., some thirty miles from Niskayuna, and was accompanied by those extraordinary physical manifestations which a little later characterized the great revivals in Kentucky and Tennessee. In the spring of 1780, some of those who had been most affected by these manifestations, visited Mother Ann at Watervliet, and found in her revelations, as they believed, the explanation of their experiences. Led by their statements, others visited her, and the number of adherents to her doctrines began to increase rapidly, and continued to do so until some time after her death, which occurred in 1784. Among the revelations which she professed to have received was one directing that there should be a community of goods among her adherents, and another requiring their organization into one or more unitary households. In 1787, Joseph Meacham, who had formerly been a Baptist preacher, and who was one of her earliest converts at Niskayuna, gathered her adherents into a settlement at New Lebanon, and established there the first unitary household on a large scale, and with complete community of goods. He was an able administrator, and in five years he had organized 11 Shaker settlements, in New York, Massachusetts, Connecticut, New Hampshire, and Maine. No others were established until 1805, when, after some years effort, four were established in Ohio, and 2 in Kentucky. All are on the same model as that of the New Lebanon Community, regarded from the first as the mother house. Each settlement consists of from two to eight families or households. Each family occupies a large dwelling-house, divided through the center by wide halls, and capable of containing from 30 to 150 inmates, the men occupying one end and the women the other. Beside these, there are storehouses, workshops, dairy houses, a school house for the children they adopt, and a meeting-house or hall. Considerable tracts of land are attached to each settlement, ranging from seven to ten acres to each member. They believe idleness to be sinful, and hence every member who is able to work is employed in some useful labor. They cultivate flowers, medicinal herbs and roots, fruits, vegetables, and collect garden and

flower seeds, dry and pre-serve fruits, put up dried herbs and roots, and make medicinal extracts. They have also extensive manufactories connected with their settlements. Brooms, wooden and willow ware, some descriptions of cloths, flannels, etc., are produced by them. Their schools are of high grade and abundantly supplied with the best text books, and apparatus. Their doctrines as stated by their chief elder, F. W. Evans, are these: "God is dual, there being an Eternal Father and Mother in the Deity, the heavenly parents of all angelical and human beings. The revelation of God is progressive; in the first or antediluvian period of human history, God was only known as a Great Spirit; in the second or Jewish period, he was revealed as the "I am that I am," or Jehovah; in the third cycle, Jesus made him known as a Father; and in the last cycle, commencing with 1770, God is revealed in the character of Mother, an Eternal Mother, the bearing spirit of all the creation of God. This last is regarded by them as a revelation of God's affectional nature, a manifestation of the divine love and tenderness. They believe Christ to be also dual, male and female, a supra-mundane being, and, at his first appearing, the communicator of the new revelation to Jesus, who, in their system, was a divinely instructed, pure, and perfect man, and who, in consequence of his divine anointing, became Jesus Christ. In the new revelation made to Jesus, these truths were first brought to light; the immortality of the soul, and the resurrection of the soul, which they define as the quickening of the germ of a new life, after the death of the first, Adamic, or generative life.

All who marry or are given in marriage, or who indulge in the earthly procreative relation, they call "the children of this world," and followers of the first Adam; they do not condemn them for living in the marital relation so long as they confine its use simply to the purpose of procreation, the production of offspring being, in their view, the only justification of sexual intercourse. But Shakers, as Christians, hold that they are called to lead a spiritual and holy life, not only free from all lust and carnal sexual indulgence, but even to rise above the order of natural and innocent human reproduction, being themselves the "children of the resurrection," and as such daily dying to the generative nature, as Jesus and the apostles died to it, and thus becoming new creatures,

who are able to comprehend the "mysteries of God." Among the other doctrines in which, as they believe, "Christ instructs Jesus," were, human brotherhood, and its development in a community of goods; non-resistance; non-participation in any earthly government, and the necessity of a life of celibacy and virgin purity to a perfect Christianity.

The second appearing of the Christ "without sin unto salvation," they believe took place through Mother Ann Lee, in 1770. She, "by strictly obeying the light revealed in her, became righteous, even as Jesus was righteous. She acknowledged Jesus Christ as her Head and Lord, and formed the same character as a spiritual woman, that he did as a spiritual man." The necessity for a second appearing of Christ in the female form, resulted from the dual nature of Christ, and of the Deity. "Still it was not Jesus, nor Ann, but the principles already stated, which were the foundation of the Second Christian Church. Their importance is derived from the fact of their being the first man and the first woman perfectly identified with the principles and spirit of Christ." This second appearing of Christ they believe to be the true resurrection state, and repudiate a physical resurrection as repugnant to science, reason, and Scripture. We have noticed their four cycles of human religious progress; they also believe that there are four heavens and four hells, the first three of which are still places of probation. The first heaven and hell were for the good and wicked of the antediluvians, and the "spirits in prison," to whom Christ preached in the interval between his death and resurrection, were the wicked of that cycle. Gehenna is the name they give to the second hell, to which are consigned wicked Jews and heathen who died before the coming of Jesus; and the second heaven is paradise, where the thief on the cross had the promise of going. The third heaven is that of the church of the first appearing of Christ, to which Paul was caught up. Higher and more glorious than those which preceded it, it is still not the home of perfect souls. The hell of the third cycle is a place of torment for those who did not believe in, nor follow Christ, according to the light of those days. The fourth heaven is now forming; in it Jesus and Mother Ann reside, and to it will all those go who have resisted temptation until their evil lusts and propensities are all destroyed, and the

life of the generative, natural man is dead in them, for such are born of God, and cannot sin. No one but Jesus had ever attained to this previous to the second appearing of Christ in Ann Lee. It is the heaven of heavens, and to it will be gathered not only all who accept the doctrines of the Shakers in this world, and attain to the new birth, but all those in the lower heavens and hells who shall yet accept them; and when their decision is finally made, the lower heavens and hells, and the earth will be destroyed, and only the fourth heaven for the true believers, and the fourth hell for the finally impenitent, will remain. Each cycle has had its own Holy Spirit, the spiritual efflux from the Church in the heaven of that cycle to the inhabitants of earth at the time. They hold to oral confession of sins to God in the presence of one or two witnesses, as essential to the reception of the power to forsake sin. They believe that the second dispensation (that of Moses) was intended to teach by revelation, God's truth pertaining to the earth life chiefly, and they regard the principles of the Levitical laws, in regard to food and agriculture, etc., as binding to-day as when they were given. All physical disease they say, is the result of some physiological sin against the teachings of Moses, either directly or indirectly. They believe in the power of their members to heal physical diseases, by means of prayer and the regulation of the diet.

The Bible they regard as a record of divine angelic ministrations to man, and as a more or less imperfect account of the religious experience and history of the Jews. They believe that the mental and spiritual condition of the seers and prophets whose prophecies are therein recorded, has materially modified the revelation, and that it has been still farther weakened and impaired by the imperfections of the translators; the book of Revelations having suffered less than any other from these causes, inasmuch as it is utterly incomprehensible to the generative man, and could not be comprehended even by the spiritual until the second appearing of Christ (through Mother Ann Lee), as that was the only key to unlock its mysteries. The revelations of Ann Lee and of others of their elders who have been inspired to speak the words of God, they regard as important and binding on them.

Their mode of worship is peculiar. The two sexes are usually ranged in ranks facing

each other, the front ranks being from six to ten feet apart. First there is usually an address by one of the elders, "who is moved to speak" on some doctrinal subject, or some practical virtue, usually closing with a recital of the exalted privileges which they enjoy over the "world's people;" after this they sing a hymn, and then form in circles around a band of male and female singers, and commence marching or dancing, and when, as is sometimes the case, the excitement and fervor reaches its height, their motions, though retaining the order and rhythm of the dance, become inconceivably rapid. At these seasons they believe themselves to be under the influence of spirit agencies, both of angels, and the departed members of their own brotherhood, who have attained in the other life to a greater freedom from the generative nature and order, and a more complete resurrection of the soul, than those who are still in the body can reach. Their ministry are very few in numbers. Two of their most judicious and experienced brethren and the same number of sisters are chosen to have the oversight of from one to three or four Societies; so that there are only twenty or twenty-four of these ministers in all. Each family in every Society has also four elders, viz., two brethren, and two sisters, who have charge of it, and the temporalities are cared for by two deacons, and two deaconesses.

There are three classes of members: 1. The novitiates, who unite with the Society in religious faith and principle, but do not enter into the temporal connection with it. Believers of this class are not controlled by the Society as to their property, children, or families.

2. The Juniors, who join one of the families of the Society, and unite in its labors and religious exercises, but who have not relinquished their property to the Society, or if they have given the Society the improvement of it, may resume it at any time, though without interest; and 3d, the Senior class, who, after a full and complete experience of the Shaker system and faith, have deliberately consecrated themselves, their services, and all their property to the Society never to be reclaimed by themselves or their legal heirs. All who retain their connection with the Shaker Communities are amply provided for in health, in sickness, and in old age. The Shaker Communities are all thrifty and have acquired by their industry, considerable, and some of them very large amounts,

of property. They had, at the latest reports, 18 societies, about 6,500 full members (Seniors), and, perhaps, 1,000 more juniors and novitiates, besides a considerable number (nearly three thousand, it is said) of children, orphans, and others, whom they have adopted, and whom they carefully educate. They are thrifty, industrious citizens, and in all the relations of life very exemplary.

IX. UNITAS FRATRUM, OR MORAVIANS.

THE MORAVIANS, OR UNITY OF THE BRETHREN (*Unitas Fratrum*), as they style their religious body, originated with the Bohemian and Moravian churches of the 9th century, but did not assume their present organization till 1457, although they identify themselves with the followers of John Huss more than half a century earlier. They were almost crushed out by the persecutions of Ferdinand II, in 1621 and the following years, but through the fostering influence of the writings and teachings of Amos Comenius, one of their bishops, they were enabled to maintain a secret existence. About 1720 a Moravian exile, Christian David, began to address them earnestly, and a revival ensued. In 1722, two families, subsequently followed by others, made their escape from Moravia, and, after a journey of eleven days, reached the estate of Count Zinzendorf, a young Saxon nobleman, and were cordially received. The Count became thenceforth their leader, and in five years had 300 Moravians on his estate. They had built a village on the Hutberg, called Herrnhut. In 1735, they had obtained the Episcopal succession of the *Unitas Fratrum*, and in 1749 they were acknowledged by the British Parliament as an Episcopal Church, and encouraged to settle in North America. They accordingly founded several settlements in the American Colonies, and engaged with great zeal in missionary labors among the Indians, in which they were very successful. They also founded missions in Greenland and elsewhere, many years before the other Protestant denominations had engaged in missionary effort. Their plan of "settlements" or villages in which no person could be a permanent householder unless he or she was a member of the Church, as well as their unitary household of single men and youths, of single sisters and young maidens, and of widows, each presided over by elders of their own sex, their very rigid rules in regard to marriage,

and their exclusive and earnest devotion to the missionary work, while it kept their numbers small, greatly contributed to their purity of faith and doctrine. At the period of the Revolution, they probably did not number, of full communicants, in the United States, more than 3,000 souls, and, perhaps, not so many. They had, beside, their several thousand converts among the Indians, who remained faithful to their religious principles, and a considerable number of whom were martyrs to their faith. The distinctive settlements, and the brethren's, sisters', and widows' houses are now entirely given up in the United States. They have two provinces, a Northern, and a Southern, the headquarters of the northern being at Bethlehem, Penn., and of the southern, at Salem, N. C. They have also large boarding schools, and are predominant in the population at Bethlehem, Nazareth, and Litiz, Penn., and at Salem, N. C.

The Moravians are thoroughly Evangelical in their doctrines, and while they sympathize most heartily and fully with the Evangelical churches in all the great cardinal doctrines of scriptural Christianity, they regard it as their special mission to make the principal theme of their preaching and teaching, the life, merits, acts, words, sufferings, and death of the Saviour; considering the revelation of God in Christ as intended to be the most beneficent revelation of the Deity to the human race. In thus preaching and teaching, they carefully avoid entering into any theoretical disquisition on the mysterious essence of the Godhead, simply adhering to the words of Scripture. Admitting the Sacred Scriptures as the only source of Divine Revelation, they nevertheless believe that the Spirit of God continues to lead those who believe in Christ, into all truth; not by revealing new doctrines, but by teaching those who sincerely desire to learn, daily better to understand and apply the truths which the Scriptures contain. They believe that to live conformably to the gospel, it is essential to aim in all things to fulfil the will of God. Even in their temporal concerns, they endeavor to ascertain the will of the Lord. They do not, indeed, expect any miraculous manifestation of his will, but only endeavor to test the purity of their purposes by the light of the Divine Word. Nothing of consequence is done by them, as a Society, until such an examination has taken place; and in cases of difficulty, the question is decided

by 100, to avoid the undue preponderance of influential men, and in the humble hope that God will guide them rightly by its decision, where their limited understanding fails them. In regard to their general, doctrinal belief, the following summary, revised and put forth by their General Synod in 1869, is their most authoritative statement:

"We regard every truth revealed to us in the Word of God as an invaluable treasure, and sincerely believe that the loss of life itself would be a trifling evil compared with the denial of any one of them. But most especially is this the case with that truth which the Renewed Church of the Brethren has ever regarded as her chief doctrine, an inestimable jewel, which, by God's grace, she still holds fast:

'That whoso'er believeth in Christ's redemption,
May find free grace and a complete exemption
From serving sin.'

From this great truth, we deduce the following points of doctrine most essential to salvation:

a. The doctrine of the total depravity of human nature,—that there is no health in us—and that, since the fall, we have no power to help ourselves out of the bondage of sin.

b. The doctrine of the love of God the Father, who 'has chosen us in Christ, before the foundation of the world,' and who 'so loved the world that he gave his only begotten Son, that whosoever believeth on Him should not perish, but have everlasting life.'

c. The doctrine of the real Godhead, and the real manhood of Jesus Christ; that God, the Creator of all things, was manifest in the flesh, and has reconciled the world unto himself—that 'He is before all things, and by Him all things exist.'

d. The doctrine of the atonement and satisfaction of Jesus Christ for us; that he 'was delivered for our offences, and was raised again for our justification,' and that in his merits alone we find forgiveness of sins and peace with God.

e. The doctrine of the Holy Ghost and his gracious operations; that it is he who works in us the knowledge of sin, faith in Jesus, and the witness that we are the children of God, and that without him we cannot know the truth.

f. The doctrine of the fruits of faith; that it must show itself as an active principle, by a willing obedience to God's commandments, flowing from love and gratitude, and that

genuine faith *will* ever be thus distinguishable."

In their church polity, the Moravians have points of similarity to several other denominations; they have bishops, presbyters, and deacons like the Protestant Episcopal Church, but their bishops are not diocesan, but are appointed for the whole church; they hold to Episcopal succession, which they derive through the Bohemian and Moravian churches, and which, if apostolical, comes through Paul instead of Peter; but their bishops possess no governing power by virtue of their bishopric; it is the General Synod and its boards that govern, and the bishops derive their power, if they have any, from their connection with some of these boards; their presbyters or elders are preachers and pastors; their deacons are young ministers and missionaries, who can administer the sacraments after receiving their first ordination. They have a liturgy consisting of a litany, forms for infant and adult baptism (they are Pædo-baptists), the sacrament of the Lord's Supper, the rites of confirmation and ordination, the burial of the dead, and marriage. Love-feasts, the apostolical *agapæ*, are celebrated, and once a year, or oftener, there is the rite of "washing the saints' feet." Their General Synod, always held at Bethelsdorf, in Saxony, meets only once in ten or twelve years. It has cognizance of the whole affairs of the "Unity of the Brethren;" but in most matters, local Boards of Elders of the several provinces, have control in the interim of the sessions of the Synod. Each province has its synod, and its Provincial Elders' Conference, and these, and not the Bishops, manage all matters connected with the Church in their province. The American province is divided into two districts, a northern and a southern. They are still very active in the missionary work, and have, in addition to their missionaries among the heathen, nearly a hundred of their ministers who are serving in Lutheran and Reformed churches. In these churches, there are many thousands who are almost as closely affiliated to them as their own members. Every church is divided into three classes: the *Catechumens*, comprising the children of the brethren, and adult converts; the *Communicants*, who are admitted to the Lord's Supper, and are regarded as members of the church; and *The perfect*, consisting of those who have persevered for

a long time in a course of true piety. From this last class are chosen in every church by a plurality of votes, the elders, who are from three to eight in number. These elders are of both sexes, and are assistants to the pastors, in the general church work.

The latest statistics we have of the Moravian Church are only to the close of 1868. They had then five bishops, one of whom has since deceased; 66 ministers; 54 congregations; 6,768 communicants; 11,855 members, including baptized children, etc.; 623 Sunday School teachers, and 5,959 Sunday School scholars. Their boarding schools have increased to six by the addition of one at Chaska, Minn., and one in Bartholomew Co., Ind. They have a theological school at Bethlehem, Penn. Their only periodical in the United States, *The Moravian*, is published at Bethlehem. There is no statement of the portion of the missionary work, or the missionary contributions from the American Moravian churches, the mission work being conducted from the headquarters in Saxony. The entire contributions of the whole church for missionary purposes, (which had 15,176 communicants in 1868) was about \$125,000.

X. UNITARIANS AND UNIVERSALISTS.

I. UNITARIANS. The rejection of the doctrine of the Trinity, and the subordination of the Son to the Father, with the acceptance of the other doctrines which have been affiliated with it, has existed in one form or another since the second or third century. At first it was Arianism, contending that the expression, "only begotten Son of the Father," implies a beginning and a subordination of the Son; this view, though maintained even to the early part of the present century in some quarters, gave place generally, to the slightly modified theories of Faustus and Laelius Socinus, in the 16th century, and these, though still prevalent on the continent of Europe, and largely held in the last century in England, by Priestley and his followers, have in their turn been succeeded by the Unitarianism of Channing and his successors. Priestley's views, founded on the principles of the sensational philosophy, and accepting religious truths on the evidence of miracle, but limiting the number of those truths to the cardinal doctrines, the unity of God, and the general resurrection, found some credence in the American Colonies about the middle of the last century. Priest-

ley himself visited Philadelphia, in 1779. Emlyn's "Inquiry into the Scripture Account of Jesus Christ," was published in Boston, in 1756, and there was a gradual lapsing of very many of the clergy of Massachusetts into Arian views in the latter part of the eighteenth century, the result in part, doubtless, of that looseness of doctrine which grew out of the adoption of the Half way Covenant. Toward the close of the century, the tone of religious society in Boston was very generally *Unitarian*, repudiating the Divinity of Christ, and the necessity of an atoning sacrifice, but declining to enter into particulars in regard to the exact status of Christ in their religious system. In 1805, a Unitarian was elected professor of divinity in Harvard University. But as yet, there was no separation, and no lines were drawn, among the Congregationalists of Massachusetts, between Orthodox and Unitarian. The separation came in 1815 and the following years, when the eloquent Channing avowed his Unitarian views, and led off from 15,000 to 20,000 members of the Congregational churches of Massachusetts, or nearly 200 congregations. Channing was not an ultraist in his views, and his plan of withdrawing interest from points of controversial divinity, subordinating religious theories to the religious life, and bringing into marked prominence the spiritual elements of human nature, and in this way initiating the practice of trying religious systems by the instincts and sentiments of the soul, was exceedingly attractive to those restless spirits who had so long been in search of some faith which could satisfy their aesthetic nature, and quiet their perturbed spirits. But Channing's successors went farther than he, and many of them in a different direction.

It is hard to define the Unitarian belief, because it is not, in any sense, a unity. While its adherents have some positive points of belief, in which, however, they widely disagree, their tenets are better expressed by a series of negatives, than by positive declarations, confessions, or creeds. They agree in holding to the Unity of God, and the subordination of the Son of God; but while some of them do not attempt to define his real position in their religious system, others hold to every phase of belief from those who accept the Trinity in a philosophical sense, but reject the deity of Christ, to those who hold him to have been mere man, a weak and peaceable man, or a myth.

A considerable number, though not a majority, believe him to be a super-angelic being, divinely commissioned to be the mediator between God and man; others hold that he was a teacher, the prophet and founder of a new religious system; the major part regard him as sinless and pure in his teachings and life, while a not inconsiderable minority class him with Moses, Zartusht, Gotama, Mohammed, and Swedenborg, as a reformer, but by no means an infallible one. They generally regard the Holy Spirit as an influence, while some agree in rejecting, in whole or in part, the doctrines of man's depravity and moral inability, but in regard to the atonement, they range all the way from a modified conception of Christ's office as a Redeemer and Saviour, to the opinion that his whole function was discharged in his office of teacher, exemplar, or reformer. Very few Unitarians hold to the doctrine of eternal punishment of the wicked, but here again their views vary from those who believe in a protracted period of retribution, to those who hold to a speedy re-toration, or those who entertain the dogma that the only retribution for sin is in this life. In regard to the inspiration of the Scriptures, there is a similar diversity of belief. Channing, Andrews, Norton, and the early American Unitarians, like their English and Polish brethren, held to the plenary inspiration of the Scriptures, and some of them wrote ably and eloquently in defence of the doctrine; but the "Advanced Unitarians" of the present day, "do not appeal to the Scriptures as inspired and infallible oracles, but discuss religious questions on grounds of philosophy alone. Regarding the Bible as the most interesting and valuable part of the world's literature, they seek in it illustrations of spiritual laws, but not final statements of moral and religious truth. To some, the Vedas and Shastas of the Hindoos, the Zendavesta, the Koran, and the revelations of Swedenborg, are of nearly equal authenticity and inspiration with the Bible.

Unitarianism can hardly be said to have any distinctive ordinances or sacraments. The churches which first separated from Trinitarian Congregationalism, required baptism both of infants and adults, and especially of the latter, but it had lost its significance with their changed views of the atonement, and now infant baptism is wholly abandoned, and adult baptism only maintained in a few churches on sentimental grounds. The

same may be said of the sacrament of the Lord's Supper. Where practiced, it is only as a means of cultivating the religious life, and not as a sacrament at all. In their church polity, they are Congregationalists, with, perhaps, somewhat more independency than the Orthodox Congregationalists. Some of their churches have adopted a sort of liturgy, and maintain a vesper service of a musical and devotional character. They have, within the past fifteen or twenty years, manifested an increased spirit of propagandism, disseminating Channing's works, and other Unitarian works published by the American Unitarian Association, and conducting some Home and Foreign missionary operations through their denominational organizations. They have given increased attention to the promotion of education, and have maintained among their clergymen that high reputation for elegant belles-lettres attainments, and rhetorical ability, which have characterized them from the first. They have planted Unitarian Societies in most of the large cities throughout the country, and though their congregations are neither numerous nor large, they have collected in them a considerable number of men of fine culture and aesthetic tastes. Still Unitarianism proper can hardly be said to flourish out of New England, hardly, indeed, out of Massachusetts. Its adherents there and elsewhere deserve credit for their active humanitarian efforts. In rescuing vagrant and vicious children from the evil influence to which they are exposed, in caring for the aged and infirm, the sick and homeless, and especially for their efforts in behalf of the sick and wounded soldiers of our late war, in connection with the United States Sanitary Commission, and their earnest loyalty, the Unitarians are deserving of all honor.

The Unitarians have under their control three colleges, viz: Harvard University, Cambridge, Mass.; Antioch College, Yellow Springs, Ohio, and Humboldt College, Humboldt, Iowa. They have also three theological or Divinity Schools; viz: the Cambridge Divinity School, with 5 professors, and 36 students; the Boston School for the Ministry, Boston, with 12 instructors, and 23 students; and the Meadville Theological School, with 8 professors and 29 students. They had also one nearly organized at Chicago, previously to the great fire.

They had, in 1870, five periodicals: two monthlies, "*Old and New*," and the *Monthly*

Religious Magazine; one semi-monthly, the *Sunday School Gazette*, and two weeklies, *The Christian Register*, and *The Liberal Christian*. Their statistics in 1870, were: one National Conference, 347 societies, 396 ministers, of whom 148 were not in the pastorate. These societies represent it is believed, from 30,000 to 40,000 members, and an adherent population of 60,000 to 80,000. The American Unitarian Association, which publishes denominational books and aids Unitarian educational institutions, has an annual income of \$100,000 or over. They have four or five mission stations in India, also aided by this Association. There are Sunday Schools attached to many of the societies, but no general statistics of them are published. In most of the cities there are Young Men's Christian Unions, with libraries and reading rooms attached.

II. UNIVERSALISTS. Though entirely distinct in their origin, and giving special prominence to a dogma which the Unitarians keep partially in the background, there is really very little difference in the doctrinal belief of Unitarians and Universalists. At first they appealed to different classes of society; the Unitarians having among their adherents, especially in Massachusetts, a large proportion of the refined and scholarly class, and their discourses being models of graceful rhetoric, while the Universalists gathered into their congregations very considerable numbers of working men, sharp and ready reasoners, but with no great amount of culture or refinement, and their preachers cultivated the power of rough and ready declaration rather than the graces of oratory. There had been very few, if any, acknowledged Universalists in the American Colonies prior to 1770, though undoubtedly some prominent theologians had rather hoped than believed in the final restoration of those who had died impenitent. In that year, however, John Murray, who had been an English Wesleyan preacher, but had become a convert to Universalist doctrines, as taught by one James Rely, came over to America, and landed in New Jersey. He soon went to Massachusetts and commenced a series of itinerant journeys through the states, preaching his views. At first, he did not make many converts, and it was not until 1779 that the first Universalist Society was organized, in Gloucester, Mass. In 1781, Rev. Elhanan Winchester, a Baptist clergyman of Philadelphia, avowed his belief in the final

restoration of the wicked to happiness and heaven, and organized a church of Restorationists, in that city. From that time the Universalists began to increase, their growth being promoted by the very strong opposition manifested towards them. In 1791, Rev. Hosea Ballou, who had also been a Baptist minister, espoused the views of Murray, and advocated them with great vigor and earnestness. The growth of the denomination has been steady and considerably rapid during the present century. The most full and satisfactory exposition of the doctrines of the Universalists we have ever seen is that given by Rev. T. B. Thayer, one of their clergymen, in the *New American Cyclopædia*, Vol. XV, pp. 834, 835. It is as follows: I. They believe that God is infinite in all his perfections, creating man with the fixed purpose that the existence he was about to bestow should prove a final and everlasting blessing; that foreseeing all the temptations, transgressions, and struggles of man, he shaped his government, laws, and penalties with express reference to these emergencies, and adapted the spiritual forces to the overcoming of all evil; that, being almighty, he can convert and save a world of sinners as easily as he converted and saved Saul of Tarsus, or Matthew the publican, and without any more violation of free agency in one case than in the other. They also believe in the perfection of divine justice, and affirm, on this ground, that God would not impose on finite beings a law infinite in its demands and penalties; but that being perfectly just, he will deal with all men according to their works, whether good or bad.

II. They uniformly reject the doctrine of the Trinity, giving to Christ the second place, and making him subordinate to the Father. They believe that he is gifted with spirit and power above all other intelligences; that he is "God manifest in the flesh," *i. e.* that God has displayed in him the brightness of his glory, and the express image of his person, as in no other being tabernacled in flesh; that he was sent of God to be the Saviour of the world, and that he will actually save it, because God would not offer, nor would Christ accept, a mission which both knew would end in failure; therefore, they say, the work of redemption will be thorough and universal.

III. They believe that man was and is created upright, but liable to sin; that transgression comes not out of any original cor-

ruption of heart, transmitted from Adam; but out of ignorance and unbelief: that all men are formed, as Adam was, in the moral image of God; and that this image though it may be disfigured by sin, can never be wholly lost. Faith and regeneration remove the stains and defilements of sin, and renew or reform the soul in the divine likeness.

IV. They believe the new birth to be that thorough change of heart which takes place when a man, wrought upon by divine grace, forsakes his sins, or turns from his former life of wickedness and indifference, toward God and the Saviour, and is drawn into fellowship with the Holy Spirit, and thus quickened into new spiritual vitality, consecrates himself into a life of active goodness and piety. The new birth is not supernatural, but the result of appointed means suitably improved. The Holy Spirit blesses the use of these means, and moves upon the heart of the sinner, encouraging, comforting, assisting, sanctifying. They do not believe in instantaneous regeneration, though they allow that there may be a turning point in the life of every man when his attention is specially directed to religion. Conversion is only the commencement of religious effort.

V. They teach that salvation is no shelter nor safety, nor escape from present or future punishment. It is inward and spiritual, and not from any outward evil, but deliverance from error, unbelief, sin, the tyranny of the flesh and its hurtful lusts, into the liberty and blessedness of a holy life, and supreme love to God and man. This is an important doctrinal and practical point with Universalists, and is constantly enforced in their preaching and writings. They urge on all to seek salvation, not from the torments of a future hell, but from the present captivity of sin. In reply to the objection that millions die in sin, in pagan ignorance, and unbelief, they answer that no one is wholly saved in this life, but that all men are saved, in a greater or less degree, after death, and assert that the power of Christ over the soul does not cease with the death of the body, but that he continues the work of enlightenment and redemption, till he surrenders the kingdom to the Father, which does not take place till after the resurrection is complete.

VI. The resurrection is not merely a physical, but a moral and spiritual change. It is not only clothing the soul with an incorruptible body, but it is an *anastasis*, a

raising up, an exaltation of the whole being into the power and glory of the heavenly; for 'as we have borne the image of the earthy we shall also bear the image of the heavenly.' It is a change, they say, by which we become as the angels, and are 'children of God, being (or because we are) children of the resurrection.' It must therefore be something more than clothing the soul in a spiritual body. It is, beside this, growth in spiritual strength and power, in knowledge, in holiness, in all the elements and forces of the divine life, until we reach a point of perfectness and blessedness described in the term *heaven*. This resurrection or lifting up of the soul into the glorified life of the angels, is the work of the Lord Jesus Christ. The end of his mediatorial reign, the completion of his saving work, and the final surrender of his kingdom back to God, does not take place till after this *anastasis*, this uplifting of all the dead and living into the 'image of the heavenly,' is completed.

VII. On the subject of rewards and punishments, the Universalist belief is substantially, that holiness, piety, love of God and man, are their own reward, make their own heaven here and hereafter; and that in the nature of things no other reward is possible. If men love God with all their heart, and trust in him, they find, and are satisfied with, the present heaven which love and faith bring with them. They hold the same doctrine respecting punishments; that it is consequential, and not arbitrary—the natural fruits of sin; that it is for restraint, correction, and discipline; and that God loves as truly when he punishes as when he blesses, never inflicting pain in anger, but only because he sees that it is needed, as medicine is, to prevent a greater evil. They affirm that the law is made for the good of man, and, of course, that the penalty cannot be such as to defeat the object of the law. Transgression brings misery, or punishment, which is designed to correct and restore to obedience, because obedience is happiness. They maintain that pain, ordained for its own sake, and perpetuated to all eternity, is proof of infinite malignity; but God, they say, is infinitely beneficent, and therefore all suffering must have a beneficent element in it, all punishments must be temporary, and end in good."

The Universalists are very generally believers in the doctrine of Restoration. They do not deny the punishment of sin beyond

this life, but believe that it will be temporary, and end in a restoration of the entire race to holiness, happiness, and heaven.

The Universalists are paying much attention to their educational institutions. They have now five colleges, viz : Tufts College, Medford, Mass., with 15 professors, and property valued at \$805,000 ; Lombard University, Galesburg, Ill., with 6 professors, and property valued at \$265,000 ; St. Lawrence University, at Canton, N. Y., with 9 professors, and property worth about \$40,000 ; Buchtel College, Akron, Ohio, founded in 1870, with \$60,000 endowment ; and Smithson College, Logansport, Ind., also founded in 1870. They have two divinity schools, both well endowed, one in connection with Tufts College, the other with the St. Lawrence University. They have, also, eight academies, or institutes of high grade, most of them liberally endowed. They have 13 periodicals. Their statistics, in 1870, were : 83 associations, 911 societies, 620 ministers, and a probable membership of their societies of from 90,000 to 100,000, with an adherent population of over 200,000. They have a considerable number of Sunday Schools, but do not give the statistics of them. In 1870-71, they raised a centenary fund in commemoration of Mr. Murray's work in founding Universalist societies, of \$200,000, to be called the Murray Fund, and to be devoted to the aid of theological students, the distribution of Universalist literature, church extension, and the missionary cause.

III. THE HICKSITE OR SECEDING SOCIETY OF FRIENDS IN AMERICA, are Unitarians, in their view of the divinity of Christ. (See VIII, ii.)

IV. "THE CHRISTIAN CONNECTION," at the West, have affiliated with the Unitarians and a large portion of them are believed to hold Unitarian views in regard to the divinity of Christ. In the Eastern and Middle States, they are generally Trinitarians. (See II, vii.)

XI. THE NEW JERUSALEM CHURCH, NEW CHURCH, OR SWEDENBORGIAN.

THIS denomination refuse to be called a sect of the Christian church, claiming to be entirely distinct from any branch of the Christian church and to belong to a new dispensation as fully and as far removed from the Christian dispensation as that was

from the Jewish. They insist, indeed, that the Christian dispensation passed away and came to an end in 1757, and that they are the new dispensation, the New Jerusalem, which has come down from God out of heaven to take the place. The first congregation of the New Jerusalem Church was formally organized in London in 1788, by Robert Hindmarsh, a printer in Clerkenwell, who was chosen by lot, to baptize and ordain his comrades in the ministry. Few if any societies were organized in the United States before 1820, although there were undoubtedly some believers in the New Church doctrines at an earlier date. Their doctrines are those put forth by Emanuel Swedenborg, a Swedish nobleman, statesman and philosopher (1688-1772), a man of extensive attainments in science and of most pure and exemplary life, who, after publishing many scientific and philosophical works, believed that he was favored with visions and revelations from the spiritual world, and in 1745 at the age of 57 relinquished all office and gave himself to communion with the invisible world and to recording his visions and the doctrines he had been therein taught, for the benefit of those who should come after him. No one believes Swedenborg to have been an imposter. Everything in his circumstances and character refutes such a supposition ; but there are many who regard him as suffering under hallucinations and as being of unsound mind. He lived to be nearly 85 years of age, and in the last twenty-seven years of his life wrote many books, all on topics connected with his supposed revelation. Some of these books (all written originally in Latin,) contain passages of great beauty and interest ; but the greater part have a mystical character, and are not specially attractive except to those who profess to comprehend them by a spiritual insight. We have not the space for anything like a full analysis of the doctrines put forth in these numerous volumes. His doctrines seem to be based on a theory or science of correspondences, which he believed himself to have rediscovered after it had been lost for ages. The law of correspondence is universal ; the natural world is a repetition of the spiritual world, and the spiritual world of the invisible mental world. Unseen evil is manifested in things hurtful and ugly, unseen good in things useful and beautiful. Man is a microcosm, or little world ; nature is man in diffusion ; all things in nature—fire,

air, earth, and water, every beast, bird, fish, insect, and reptile, every tree, herb, fruit, and flower—represent and express unseen things in the mind of man. The scriptures are written according to correspondences, and by aid of the science their mysteries are unlocked. This mystical interpretation gives us to understand that the early chapters of Genesis are not to be received in any historic sense. Adam signifies the most ancient church, and the flood its dissolution; Noah an ancient church which, falling into idolatry, was superseded by the Jewish. The spiritual sense pervades the scriptures with the exception of Ruth, I. and II. Chronicles, Ezra, Nehemiah, Esther, Job, Proverbs, Ecclesiastes, the Song of Solomon, the Acts of the Apostles, and the Epistles. These are all good books but not possessing the internal or spiritual sense. They are not inspired and consequently not the Word. By reason of its symbolism of the inward sense the letter of scripture (with the above exception) is holy in every jot and tittle, and has been preserved in immaculate perfection, since the hour of its divine dictation. By this doctrine of correspondences also the constitution of heaven and hell is revealed. There are three heavens, consisting of three orders of angels, severally distinguished for love, wisdom, and obedience. All angels have lived on earth; none were created such. They are men and women in every respect, the spiritual life corresponding to the natural; they marry and live in societies in cities and countries just as in the world but in happiness and glory ineffable. To the unmarried will be given the honor of caring for the little ones, and their performance of this duty will crown them with glory. All in whom love to God and man is the ruling principle, go to heaven at death. As there are three heavens there are three hells, and every angelic society has an infernal counterpart. Hell, as a whole, is called the Devil and Satan; there is no individual bearing that name. All in whom self love is the ruling motive go to hell. There is no resurrection of the earthly body. Every one passes to the final lot at death, some making a short sojourn in an intermediate state, designated the World of Spirits, where the good are cured of their superficial infirmities and intellectual mistakes, and where the evil reject all their pretences to good. The grand and distinctive principle of Swedenborgian theology is, however, the doc-

trine of life. God, it is maintained, alone lives. Creation is dead. Man is dead and then apparent life is the Divine presence. God is everywhere the same. It appears as if He were different in one man and in another; but this is a fallacy. The difference is in the recipients; by one He is not received in the same degree as another. A man more adequately manifests God than a tree; that is the only distinction. The life of devils is God's presence perverted in disorderly forms. "All things and each of them to the very uttermost, exert and subsist instantly from God. If the connection of anything with Him were broken for a moment it would instantly vanish; for existence is perpetual subsistence, and preservation perpetual creation." By this law of life is explained man's self-consciousness, freedom, and personality. All these sensations are communicated from God to man. He dwells in man so cordially, that He gives him to feel that he lives of himself, even as He lives.

The Swedenborgian doctrine of the Trinity and the Divinity of Christ is thus enunciated by his followers, in language derived from his writings: "That Jehovah God, the creator, and preserver of heaven and earth is love itself, and wisdom itself, or good itself, and truth itself; that He is one both in essence and in person, in whom nevertheless is the divine trinity of Father, Son, and Holy Spirit, which are the essential divinity, the divine humanity, and the divine proceeding, answering to the soul, the body, and the operative energy in man; and that the Lord and Saviour Jesus Christ is that God. That Jehovah, God Himself, descended from Heaven as divine truth, which is the word, and took upon him human nature, for the purpose of removing from man the powers of hell, and restoring to order all things in the spiritual world, and all things in the church, that he removed from men the powers of hell, by combats against and victories over them, in which consisted the great work of redemption; that by the same acts which were his temptations, the last of which was the passion of the cross, he united in his humanity, divine truth to divine good, or divine wisdom to divine love, and so returned into his divinity in which he was from eternity together with and in his glorified humanity, whence he forever keeps the infernal powers in subjection to himself, and that all who believe in him with the under-

standing from the heart and live accordingly will be saved. The New Church observes the ordinances of baptism and the Lord's supper, but gives them a mystical significance. The Christian church, as established by Jesus himself, came to an end, Swedenborg says, in the middle of the last century, and in one of his visions he relates having witnessed the last judgment effected upon it in the world of spirits in 1757. Then commenced the new dispensation, signified by the New Jerusalem in the Revelation of which he was to be the precursor and revealer. He made no claim to be a leader or divinely inspired person, but only a seer. He did not himself attempt to establish a church, though it was his early expectation that such a church would be raised up among some of the gentile or heathen nations. But his followers have been active propagandists, and though they may have believed, as he did, that the Christian church was dead and at an end, they have to a large extent remained in its communions, and have propagated their views among its members, while retaining their connection with it. A portion have, it is true, come out and organized separate societies or churches, but the New Church has been far more conspicuous for intellectual ability, both among its secret adherents and its avowed members, than for members. After fifty years of really zealous effort, they report only 65 ministers, 78 societies, and at the utmost not more than 4,000 avowed members, with an adherent population of perhaps 8,000. They have an efficient publishing association, with a capital of about \$15,000; a tract society which publishes 30,000 or 40,000 tracts per year; three periodicals, a weekly, a monthly, and a child's paper, a theological school at Waltham, Mass; three church schools—one of them liberally endowed, a missionary society, and several Sunday School Unions. It has also a "New Church Union" with a free library having headquarters in Boston.

XII. MORMONS, OR CHURCH OF JESUS CHRIST OF LATTER DAY SAINTS.

I. THE MORMONS under the control of Brigham Young. We have neither time nor space to go into the *history* of this imposture, the most conspicuous one of modern times; nor is it needful; for the story of the golden plates, and of Solomon Spalding's manuscript, of the successive efforts at organiza-

tion in Manchester, N. Y.; Kirtland, Ohio; Jackson and Clay counties, Missouri; Nauvoo, Illinois; the impositions, threats, and swindles of the Mormon leaders, their expulsion from Missouri, their death at the hands of a mob at Carthage, Illinois, the pilgrimage westward, the wintering in Iowa, the final arrival in 1847 and 1848, at Salt Lake, the founding of Great Salt Lake City, the building of the Tabernacle, the open practice and boast of polygamy, their collisions with the United States government, their Danite band, their murders and outrages, and their present condition, have all been told so many times as to be familiar to all. We will therefore only state their doctrines and practices according to their own authorized manuals. They believe that there are many gods and that eminent saints may in time become gods, and rise one above another in power and glory to infinity. Joseph Smith is the God of this generation. Above him in power and glory is Jesus Christ, who was the offspring of the material union on the plains of Palestine of a God with the Virgin Mary, the latter being duly married after betrothal by the angel Gabriel. Yet Christ had had a previous existence and had made the universe out of unformed chaotic matter as old as God. The God whom they describe as the father of Jesus Christ, had once been a man and still retains a human form, though he is so advanced in intelligence and power that he may now be called, comparatively speaking, perfect, infinite, &c. The Holy Spirit they believe to be also a material being and once human. Above these is an older trinity composed of Jehovah Elohim, and Michael or Adam, the latter being described as the god or superior of Christ, and below, beneath, and associated with these are gods many and lords many. Their whole Theogony seems to be a most unintelligible jumble, mingling Brahminism, Buddhism, and every other form of belief. The *second* article of their creed affirms that men will be punished for their own sins and not for Adam's transgressions. The *third* article states that through the atonement of Christ all mankind may be saved by obedience to the laws and ordinances of the gospel. The *fourth* defines their ordinances to be: Faith in the Lord Jesus, which is expounded as including obedience to the ten commandments, and to the Word of Wisdom revealed to Joseph Smith in 1833; 2. Repentance; 3. Baptism, which is administered

by immersion, only to children at eight years of age, and also to adults who had not been previously baptized. They also baptize for the dead, asserting that at the resurrection all the persons for whom a man has been baptized will be added to his family; 4. Imposition of hands to confer the gift of the Holy Spirit; 5. The Lord's Supper, administered to the recipients kneeling; they use water instead of wine, being averse to the use of the latter, and receive the sacrament every week. The *fifth* article declares that men must be called to the work of God by inspiration. The *sixth* that the same organization must now exist that existed in the primitive church. The *seventh*, that miraculous gifts—discerning of spirits, prophecy, revelations, visions, healing, speaking with tongues, &c.,—have not ceased. Among Smith's and Brigham Young's speculations in the way of discerning of spirits, one was that the soul of man was not created but had existed from all eternity, equal in duration to God. Another of these revelations was that of the transmigration of souls, that rebellious spirits (of men) would descend into brute tabernacles, till they yielded to the law of the everlasting gospel. The *eighth* article affirms that the Word of God is recorded not only in the Bible and the Book of Mormon, but in all other good books. The contradictions which exist in the Bible and other books can be very easily removed by revelations to any of the Mormon leaders or any other inspired prophets. Joseph Smith, it is said, left an "inspired translation" of the whole Bible in manuscript, but none of the leaders since have thought it worth their while to publish it. The *ninth* article expresses a belief in all that God has revealed, is revealing, or will yet reveal. The *tenth* affirms the literal gathering of Israel, the restoration of the Ten Tribes (whom they believe to be the American Indians), the establishment, of the New Zion on the Western Continent (they generally insist that this will be in Jackson county, Missouri), the millennial reign of Christ on earth, with all his holy prophets and demigods (of whom Joseph Smith will be most conspicuous), and the transformation of earth into a paradise. The *eleventh* article maintains "the literal resurrection of the body,—to flesh and bone, but not blood—blood being the principle of mortality." The *twelfth* article asserts the absolute liberty of private judgment in matters of religion. The

thirteenth declares it to be the duty of the saints and all others to be subject to the powers that be, whether monarchical or republican; and the *fourteenth* and last is as follows: "We believe in being honest, true, chaste, temperate, benevolent, virtuous, and upright; and in doing good to all men; also that an idle or lazy person cannot be a Christian, neither have salvation." The leaders, however, by virtue of the revelations they receive, can, at will, exempt themselves from the obligation of any of these rules or obligations, and most of them are notoriously profane, unchaste, and accessories to the grossest frauds and murders, if they do not commit them in person.

Their most remarkable social peculiarity is the practice of polygamy. Among the early revelations published by Smith, one was the strict enforcement of both monogamy and chastity; but about 1838 he became notoriously licentious and as after a time his wife began to complain of his amours, he had in 1843 a special revelation directing the practice of polygamy not only in his own case, but in that of the other saints. This was denied by the leaders for some years, but in 1852 they openly avowed polygamy as one of their doctrines and referred to this revelation as their authority. It is now very generally practised in Utah; Young himself having, it is said, sixty or more wives. For many years the Mormon leaders have defied the United States government and have ruled the territory of Utah according to their own views, driving out and often murdering United States officers and citizens who attempted to enforce national laws; but the opening of the territory by the passage of the Union Pacific and other railways through it, and the development of the large mining interests there, have brought in so large a population, who are not Mormons, that there is a prospect that the laws may be enforced there without serious difficulty. By the laws of the United States, as well as by common law, polygamy is a crime, and actions have recently been commenced against Brigham Young, Daniel C. Wells, and other of the Mormon leaders for adultery, and for being accessories to the murder of some men whom they had caused to be put out of the way. Young has left Salt Lake City, and it is generally believed, has fled from the territory, and some of the others have given bail, while one or two have been convicted of the minor offense.

The Mormons have habitually greatly overrated their numbers. They claimed early in 1870 a Mormon population in Utah of 150,000, while the United States census of 1870 gave the entire population of the territory as only 86,786, of whom not less than 17,000 are known not to be Mormons, aside from a considerable number of seceders from the authority of Young. Elsewhere in the United States there may be (including the seceding Mormons) seven or eight thousand; and in foreign countries perhaps 50,000 to 60,000. They claim 100,000 on the eastern continent; but they have no such following. Their hierarchy is of two kinds, the Melchizedec and the Aaronic priesthood. To the former belong the First Presidency of three, of which Young is the chief; the twelve apostles, the seventies, the patriarchs, the high priests and the elders. To the Aaronic priesthood belong the bishops, of whom in all there are 240, the priests, teachers, and deacons. Tithes are rigidly exacted from the Mormon believers to be applied to the support of worship, &c., but no inconsiderable portion finds its way into the capacious purse of Brigham Young, who by adroit management has become very wealthy, his property amounting to many millions, and being largely invested abroad.

There have been for the past twenty-five years a body of Mormons who did not go with the others to Utah, who did not recognize Brigham Young as their chief, nor practice polygamy. They have had a colony and settlement for some years in northwestern Iowa, on the borders of Dakota, and have had as their spiritual chiefs, *Emma Smith*, the widow of Joseph Smith, and of late years *Joseph Smith, Jr.* They have about 5,000 adherents, and the Mormons of Utah are very hostile to them. Of late Joseph Smith, Jr. has visited Utah, and a considerable number of Mormons who were disaffected toward Young, have recognized him as their leader. Others of the disaffected, who repudiate Young's authority and teachings though not yet willing to abandon polygamy, have followed a man named Godbe, and are known as *Godbeites*. Both these seceding organizations are bitterly denounced by Young and the Mormon hierarchy.

XIII. ISRAELITES OR JEWS.

I. THE ORTHODOX ISRAELITES, OR JEWS. This is no place for a history of the ancient

people of God in all their dispersions, wanderings, and persecutions; we can only give very briefly, their history as a religious denomination in the United States. The first Jews who emigrated to North America, it is believed, came to the then Dutch colony of New Amsterdam, in 1660. Although, from the first, they have always enjoyed complete religious liberty here, and have often been called to positions of high honor in society and under our government, yet the number of Jewish emigrants to the United States was, for a hundred and fifty years from their first coming, very small, and in 1820 they certainly did not exceed 15,000 in our entire territory. Since that time they have come in somewhat larger numbers, attracted by the opportunities offered them for successful trade and financial operations. After the revolutions of 1848, on the continent of Europe, many of those, who had participated in those uprisings, came here and have since been some of our most valued citizens. It is difficult to ascertain definitely how many are now residents in the United States; the Board of Delegates of American Israelites, in 1868 reported 200 congregations in the country. If these averaged 100 male members (a large estimate), the adherent population could not much have exceeded 40,000; but there are besides these, the Reformed Jews, a considerable number who have embraced Christianity, and many who in this country do not connect themselves with any religious organization. We are inclined to believe that 75,000 is a large estimate of the actual Jewish population of the United States, though it has been reckoned as high as 200,000. They have worship in their synagogues on the Jewish Sabbath (Saturday), with reading and expounding of the law, chanting of psalms, etc. The reading is usually in Hebrew or Aramaic, although many Jews do not understand the Hebrew well, but the explanations and discourses are in English, or in the vernacular of the country from which they have come. Many of their rabbis are men of extensive learning, and specially versed in Oriental and linguistic science. It is, of course, understood that the Jew does not recognize Christ in any religious sense, and is a Deist, rather than a Socinian or Unitarian. The following abstract of their doctrinal creed, compiled from the Thirteen Articles of Maimonides exhibits, briefly, their views on religious subjects: "1. They believe that God is the

Creator and Governor of all creatures, and that he alone has made, does make, and will make all things. 2. They believe that He is only one, in unity to which there is no resemblance, and that he alone has been, is, and will be their God. 3. They believe that the Creator is not corporeal, not to be comprehended by an understanding capable of comprehending only what is corporeal; and that there is nothing like him in the universe. 4. They believe that He is the First and the Last. 5. They believe that He is the only object of adoration, and that no other being whatever, ought to be worshiped. 6. They believe that all the words of the prophets are true. 7. They believe that all the prophecies of Moses, their master, are true, and that he was the father of all the wise men, as well of those who went before him, as of those who succeeded him. 8. They believe that the whole law which they have in their hand at this day, was delivered by Moses. 9. They believe that this law will never be changed, and that no other law will ever be given by the Creator. 10. They believe that God knows all the actions of men, and all their thoughts; as it is said: 'He fashioneth all the hearts of men, and understandeth all their works.' 11. They believe that God rewards those who observe his commands, and punishes those who transgress them. 12. They believe that the Messiah will come, and, though he delays, they will always expect him till He comes. 13. They believe that the dead will be restored to life when it shall be ordained by the decree of the Creator.

The Jews have not been very active in educational matters, but have several free schools of high grade, and, at Philadelphia, Maimonides College, founded in 1867, which though having a full course, and able instructors, is not well endowed. In matters of public charity, the founding of hospitals, asylums for orphans, the aged, and the widow, and the establishment of public libraries, and museums of art, they deserve very high praise. These institutions, and their gifts to them have not, in any case, been confined to their own people, but have been opened freely to all, and some of their liberal givers have won for themselves undying fame by their large handed charity. It is worthy of note that they provide always for their own poor. They have three or four well conducted periodicals.

II. THE REFORMED OR PROGRESSIVE

ISRAELITES. This organization, which has a Rabbinical Conference, which meets annually, and has synagogues in the principal cities, while not disposed to relinquish their Jewish birthright and privileges, yet deem some changes necessitated, by the progress of the world, in their ancient faith. They do not look for the coming of a temporal Messiah, or a return to Palestine; they believe in having their exercises in the synagogues in the vernacular. They hold to the immortality of the soul, but not to the resurrection of the body; to God's grace and justice to pardon and bless the being created in his image, and not to expiatory rites and sacrifices. We have no means of estimating their numbers.

Efforts have been made, and with considerable success, by several of the Protestant denominations for the conversion of the Jews to Christianity. There are several congregations of these converted Israelites, and a still larger number who have connected themselves, as individuals, with other Christian churches. A considerable number of Jews said to be mainly from Germany, Poland, and Portugal, have, on coming to the United States, abandoned all religious worship and faith, and given themselves up wholly to the worship of mammon.

XIV. SPIRITUALISTS.

We can hardly call the Spiritualists a religious denomination, since its professed adherents belong to almost all denominations, and many of them to none, and their single bond of union is in their belief that somehow, and in some way, they hold intercourse with the spirits of the departed. That this belief is a delusion seems to be demonstrated by the most incontestable evidence; yet very many cling to it with the utmost tenacity. The Spiritualists, and especially the so-called "spiritual mediums," may be divided into several classes. Among these are: 1. Charlatans and impostors, who deliberately profess to hold communication with the spirit world, knowing that they are guilty of a gross and fraudulent deception, but doing so for the sake of gain. This class is numerous; to it belong most of the fortune-tellers and necromancers, the greater part (perhaps we should say all) of the healing mediums, clairvoyant doctors, and the like, the exhibiting mediums, rappers, table-tippers, &c., &c. 2. The self-deluded, who,

possessing a certain amount of magnetic, odyllic or reflex-nervous power, really suppose themselves to be in communication with the spirits, when they are only reproducing their own thoughts and conjectures or those of persons about them and with whom they are *en rapport*. 3. Genuine clairvoyants, very few in number, but really endowed with a greater or less degree of the clairvoyant or seer faculty, but mistaken in imputing their visions to a different source from that from which they really come. The supposed conversations held by these persons with angelic intelligence, or the spirits of the departed who were eminent for intellectual or moral power in this life, all give evidence, which whoso runs may read, that they are "of the earth, earthy." Not one of these messages professedly from the spiritworld, however exalted in intellect in this life were the persons from whom they purport to have come, has ever risen above the dead level of bald common place, and could the persons to whom they were attributed have come back to earth and read them, they would have repudiated them most indignantly. Much the same may be said of the professed revelations of the spiritual world by these professed seers. We have read many of them and have found them invariably sensuous in their descriptions, and giving ample evidence of having been borrowed without being improved from the Koran, the oriental fables, or the word painting of Moore, Byron, Southey, Beckford, or Johnson, and sometimes, perhaps, from the hallucinations of Emanuel Swedenborg. Too much of the flesh clings to the seer to make these visions in any respect representative of that glorious spiritual state which the natural eye hath not seen, nor can see; of those experiences, which are only discerned by the spiritual man when unrobed from the garments of flesh, and made pure even as God is pure.

Still this great delusion has its thousands of votaries. Beginning in this country about 1843 with some manifestations of power as a healing medium on the part of a lad of seventeen, named Andrew Jackson Davis, at Poughkeepsie; they were gradually developed into a high degree of clairvoyance on his part, which resulted in his dictating from 1846 to the present time numerous books professing to give revelations of the condition of the various spheres which he alleged envelope our earth, and communications with the spirits which inhabited them;

descriptions of the climate, scenery and people of the various planetary bodies of the solar system, and eventually a theological system, with its pantheon of heroes and demigods which he professed to have received from the highest spiritual intelligences. That some portions of this system were rather the results of earthly study, than of heavenly inspiration, was evident to those who knew Mr. Davis's habits of study and preparation for his books. These numerous volumes have, however, had a very considerable sale, and though it would be difficult to say how many Spiritualists believed them either wholly or in part, yet they have unquestionably exerted considerable influence in forming the Spiritualist theology. Many Spiritualists repudiate them, wholly; others go far beyond them, to a gross and blasphemous infidelity. While Mr. Davis was beginning to dictate his revelations, another development of the Spiritualist mania appeared in Rochester, where a Mrs. Fox and her two young daughter's first made spirit-rapping profitable. This and table-tipping and table dancing soon became popular and lucrative exercises, and presently it was found that the spirits could spell (not always correctly) by the aid of an alphabet card. As time passed, their education improved till by the hand of a medium (their unconscious instrument, it was said) they wrote all manner of platitudes in prose and rhyme, though quite as often without sense as with it. Still later, they practised a species of phonographic writing which expedited matters for them, though not always for the unhappy mediums, who found great difficulty in putting it into readable English. Gymnastic and legerdemain feats followed, and though most of these were exposed, yet they made their impression on the minds of the gaping multitude. An adventurer named D. D. Home or Hume was the most adroit performer of these alleged Spiritualistic feats in Europe, and succeeded in deceiving many eminent though unphilosophic minds. The delusion reached its culminating point in 1858 or 1859, and has since that time been gradually waning. Both the Shakers and the followers of Swedenborg had at one time great expectations, but both have been greatly disappointed. Very many who were once deluded by it have long since abandoned it and now would not believe they could have been so grievously deceived, others not fairly con-

vinced of the delusion still entertain doubts, and will eventually shake it off; while of those who hold firmly to it still, some have become insane, some profess to derive comfort from their communication in hours of sorrow with the dear departed, and others have plunged into the abyss of infidelity or are on the high road thither.

The Spiritualists in 1858 and 1859 made the most extravagant statements in regard to their numbers; statements which must at that time have been conspicuously inexact, and are now too absurd for any one to believe. In the "Spiritual Register" for 1859 it is stated that the number of actual Spiritualists in America is 1,500,000; of those who have more or less faith in the doctrine, but do not openly espouse it, 4,000,000; public advocates, 1,900; mediums, public and private, 40,000; places for public meetings, 1,900; books and pamphlets, 500; periodicals, 30. If most of these figures had been divided by ten the quotients would have been nearer the truth at that time. At present, the number of periodicals (of which only two or three have a large circulation) is ten, the number of public advocates of Spiritualism not over 50, and the meetings mentioned about the same or possibly 75. The number of mediums of all sorts, we could not undertake to estimate; there must be several thousands; though some have unfortunately been sent to State Prison recently, and some others, who have been using their art, to aid them in their nefarious business as procuresses, ought to be. It would be difficult to find 150,000 persons who would avow themselves, to-day, Spiritualists; and equally difficult to find 200,000 more who would acknowledge any leanings in that direction. The number of books and pamphlets published *pro* and *con* may reach 500, indeed, considering the great number issued by Mr. A. J. Davis and Mr. S. B. Brittan, we think they probably will; but the sale of Mr. Davis's books, the most popular of all this class of literature, has not averaged over 20,000 copies of each.

XV. FREE THINKERS, OR ATHEISTS, DEISTS, RATIONALISTS, &c.

THE various forms of unbelief cannot fairly be called religious since they are rather the negative of all religion; nor can they be classified or numbered, since they are found under so many different names and

forms and commingled with so many other doctrines and notions; yet it is true that they include many thousands mostly from three classes: 1. Speculative philosophers, whose learning is rather superficial than profound, and who from the desire to throw off control, which is natural to the depraved heart, seek to find arguments against the authenticity and inspiration of the scriptures, against a ruling and controlling Providence, and against any plan of salvation which admits the depravity of human nature. They draw their arguments from any and every source which they deem available; at one time they deride miracles as inconsistent with reason; at another they parade geological discoveries as proving the falsity of the Sacred Record; then they are very sure that they have discovered that man has lived upon the earth 800,000 or a million of years, and that he was developed from a monad or a monkey; if driven from these positions, they find fault with the numbers of the Bible, its genealogical records, its narratives of events; the slightest apparent discrepancy is magnified, and they either conclude the sacred book a tissue of fables, a book of riddles, metaphors, and conundrums, or a series of myths. Rout them from one class of arguments, and they fly to another, often in exact contradiction of what they had previously maintained; and in default of any ground of argument they will fall to abusing and cursing the life, ministry, and work of the Divine Redeemer, using the coarsest ribaldry, though previously given to only dainty phrases; thus demonstrating that it is the enmity of the heart against God which is at the bottom of all their unbelief. 2. A larger class than the preceding is composed of working men, mechanics, who in a crude and rough way do a good deal of thinking, but being soured by the neglect of their intellectual tastes and abilities, which they believe the educated class manifest, and having the idea that they are displaying a great deal of intellectual independence by avowing themselves free thinkers, plunge boldly into the discussion of questions which they are disqualified, for the want of both early training and positive knowledge, from handling. Without being conscious of it they are merely the echoes and mouth pieces of abler but worse men, uttering the falsehood, which their leaders know to be such, but which these poor men believe merely on their assertion. With them, too, the desire that

these views may be true, that they may be thereby freed from responsibility and the goadings of conscience, has much to do with their earnestness in endeavoring to believe them. 3. Another and still larger class of unbelievers, we can hardly call them free thinkers, for they do very little thinking of any sort, are the men and women utterly brutalized by a vicious life, who are without hope and without God in the world, and who stolidly conclude that no other life, if there is another, can be worse than the present; and that somehow they will be better off after death, since, as they express it, they have had no show or chance here. These need almost a new creation to bring them up to the plane of morally accountable beings. They constitute the dangerous classes of our large cities, the material of mobs, the gangs of thieves, dead rabbits, shoulder hitters, prize fighters, burglars, and if women, the shop lifters, prostitutes, and degraded women of the slums and back alleys of the great cities. We might name as recruits in this army of unbelief, those who under the influence of the worst phases of spiritualism have lost all faith in humanity, and those in higher circles of society who departing from their early training in sound doctrine have wandered and floundered through the mazes of German rationalism, transcendentalism, and at last merged in Pantheism or utter unbelief.

A very considerable portion of the educated German emigrants, and the English workingmen who migrate to this country are Freethinkers or infidels, and in many of our large cities as well as in the newer towns and settlements at the West they have organized Infidel or Liberal clubs, and seek to bring others into their way of thinking. They have united and brought out their full strength on several occasions in the effort to have all Sabbath laws abrogated in several of the Western cities. In some of the new settlements of the West they have been so largely in the majority that they have prohibited all effort for religious worship or Sabbath observance. Their periodicals vary in character according to the class whom they address. Some are decorous in tone but aim at subverting Christianity by appeals to reason and philosophy; others are ribald and blasphemous, and denounce incessantly all Christian organizations, and Christian men. Those conducted by foreigners and in German or French, are generally

revolutionary in their character, and have much to say of priestcraft and restrictions upon the rights of the people. There are in all fifteen or twenty of these papers, but they give no indications of the number of the Freethinking class, since many of them do not read anything. There are no means of estimating with any approximation to accuracy their actual numbers. Men who have made religious statistics a study, and with equal opportunities of observations differ as widely as between 250,000 and 1,000,000; and the larger number is quite as likely to be correct as the smaller.

There are a number of small and minor sects which did not properly come under the classification we have adopted. With a brief notice of them we close this sketch of RELIGIOUS DENOMINATIONS IN THE UNITED STATES.

I. ADVENTISTS, a recent sect of Millinarians, owing its origin to William Miller of Vermont, from whom they are often called Millerites. He commenced his public teachings in 1833 and predicted the second advent of Christ in 1843. Among his disciples was one Joshua V. Himes who had been a Campbellite preacher and who surpassed Miller in earnestness and energy. After the failure of their first prediction in 1843, others were made but the adherents of the sect fell off. Himes however continued to advocate his doctrine in the *Advent Herald* and from the pulpit, and succeeded in drawing around him a considerable number of followers, of whom, since Miller's death, he has been the leader and apostle. He is said to be inclined to Unitarian views in regard to the divinity of Christ, and with most of his followers to hold that the wicked will be annihilated at the second coming of Christ. There are no definite statistics of the numbers of the Adventists, but they are estimated at about 20,000. Their other views are generally those of the Evangelical churches, though inclining somewhat to Methodism; but they have no regular creed or form of discipline.

II. ANNIHILATIONISTS. The doctrine of the Annihilation of the Wicked is not confined to Adventists. Nearly forty years ago it was defended by Rev. Henry Grew, and since that time Dr. McCulloh of Baltimore, George Storrs (an Adventist) and Rev. C. F. Hudson have published works advocating the doctrine. They have not a

large following aside from the Adventists, and most of those who believe in the doctrine remain members of Evangelical churches.

III. CATHOLIC APOSTOLIC CHURCH or IRVINGITES, a small denomination which originated with the teachings of Rev. Edward Irving in London about 1830, but afterwards considerably modified through the influence of Mr. Henry Drummond, a member of Mr. Irving's congregation. They hold to the present existence in the Christian Church of the Charisms or gifts mentioned by Paul in Cor. xii. 27-31, Eph. iv. 11-13, 1 Thess. v. 19, 20, viz. healing, speaking with tongues, prophesying, &c. In their other doctrines they agree generally with the Evangelical churches though they make confirmation or sealing by the laying on of hands of the apostles a third sacrament or ordinance. In organization and polity, however, they differ from most of the churches in having four orders of the ministry, apostles, prophets, evangelists, and angels or chief pastors, and under the latter, a fourfold service of elders and deacons, together with under deacons and deaconesses. The deacons, under deacons, and deaconesses are ordained by the angel or chief pastor, all the superior ministers or servants by the apostles who are not themselves ordained but called of the Holy Spirit to their work. In their worship they use incense-lights on the altar, the full catalogue of priestly vestments, and a very imposing and impressive ritual. They celebrate the Eucharist, every Lord's day, as well as on other occasions, and receive tithes during the service. They also have auricular confession of sin with absolutions and prayers in fourfold form. At their meetings for extemporaneous prayer and confession they encourage the speaking with tongues and prophesying. The number of congregations of the Catholic Apostolic Church in the United States is small, not more than eight or ten in all.

IV. BROTHERS or PLYMOUTH BROTHERS, a denomination which originated about 1830 under the leadership of Rev. John Darby, an English barrister of high social position, who became a clergyman of the Church of England and devoted himself to missionary labors in Ireland for several years, but being conscientiously opposed to the doctrine of Apostolical Succession he left that church and proceeded to found one which recognized no distinctive ministry

and no formal organization. Mr. Darby was a Millenarian and thought it the duty of all true Christians to gather in small bands and pray, labor, and wait for the speedy second coming of Christ. The Plymouth Brethren recognize no other title except that of Brethren or Christians; they are Calvinistic (thoroughly so) in doctrinal belief; but believe that all the Lord's children are priests and kings in his service and that any one of them who feels that he is called to the work has a right to preach or to administer ordinances. They permit no licensure or ordination, and all preaching is voluntary and without salary or compensation. They baptize adults on a profession of faith (usually immersing them) though they do not consider this indispensable to membership. They do not allow infant baptism. They exclude persons from participating in the Lord's Supper, who have been guilty of gross sins. The Lord's Supper is celebrated every Sabbath morning. In the afternoon or evening of the Lord's day they preach to and pray for such as are not converted. They believe in the efficacy of prayer for special blessings temporal as well as spiritual, and one of the Brethren, George Müller has maintained an extensive Orphan Asylum and large missionary enterprises at Bristol for many years, solely by praying for the needed funds, which as they came in were most judiciously expended. The denomination has had a rapid growth in England and on the continent, and numbers many eminent men among its adherents. In this country they have a considerable number of congregations, but are very reticent concerning their increase and growth.

V. SANDEMANIANS or GLASSITES. This denomination, which a hundred years ago was quite numerous is now nearly extinct. It derives its name from Rev. Robert Sandeman, who was not, however, its real founder, his father-in-law, Rev. John Glass of Dundee, having originated the sect. Mr. Sandeman, after preaching their doctrines for twenty years or more in Scotland, emigrated to the United States in 1764, and settled at Danbury, Connecticut, where he died in 1771, having established several Sandemanian churches in Connecticut and Massachusetts. Their distinguishing doctrines are: That faith is a simple intellectual assent to the teachings and divinity of Christ; that all mystical or double inter-

pretation of the scriptures is to be rejected; that none of their members must take part in any games of chance; that they are to abstain strictly from all blood and "things strangled;" that all collegiate training for the ministry is wrong; that no prayers should be made at funerals; that weekly love feasts in which all the members of the Church should dine together should be observed every Sabbath day; and the kiss of brotherhood should pass between all their members, male and female, at their solemn meetings; and that a plurality of elders is necessary in the church, two at least being required for all acts of discipline and the administration of ordinances and ritual. The ordinance of feet-washing originally practised by the sect has been discontinued. There are not more than two or three congregations of Sandemanians now existing in the United States.

VI. CHURCH OF THE MESSIAH, a sect founded in Maine in 1863 by a person named Adams, who had previously been a Mormon elder. He claimed to have visions and special inspirations. Among the points of the new faith was, that its members were of the tribe of Ephraim and that the time had come for them to return to the land of their fathers, where the Messiah was to set up the throne of David. In 1866, 156 of the members of the sect sailed from Maine for Palestine under the leadership of Adams and landed at Jaffa, where through the efforts of the American Vice-Consul, land had been procured for them and where they erected houses and a hotel. Dissatisfaction soon occurred. Adams was accused of mismanagement, and through the kind offices of the United States government a considerable number returned in 1867, and the remainder in 1868. The sect is probably extinct.

VII. PERFECTIONISTS. I. FREE LOVERS, BIBLE COMMUNISTS or PERFECTIONISTS, a small American sect founded about 1840 by John H. Noyes, in Putney, Vermont, but removed subsequently to Oneida, New York, where it is now known as the Oneida Community. Branches of it are also established under the same regulations at Wallingford and Brooklyn, Connecticut. This organization is a singular medley of Biblical doctrine and unholy practice. They profess to believe that a reconciliation to God is necessary for salvation, that this is accomplished through faith which is simply

an intellectual belief, and that confessing this belief the man's sins are immediately washed away, and thenceforth he is above and beyond all law, being a law unto himself; though in practice he surrenders a portion of this liberty to the family or Community in which he lives. They hold to a community of goods, community of women, or as they term it, a complex marriage; no legal marriage being considered binding and the parties to it in the community being at liberty to make new selections at will, their liberty, however, being somewhat abridged by the necessity of making their proposals through a third party and their being subject to the approval of the family and in accordance with what they pronounce physiological laws. The Community or Communities now number in all about 600 members, that at Oneida having 300. They have prospered financially, having attained large wealth by their manufactures and agricultural productions. They are said to be harmonious and contented. The men dress like the citizens of the adjacent towns, but the women have adopted a sort of Bloomer costume and wear their hair short. The influence of these Communities can only be evil on the society around them. There are several other communities in various parts of the United States, practising a community of goods but not of wives. We have already described the Shaker Communities, which have all prospered; but there are others which do not find a new theology necessary to their success, such as the German Socialist Village of Economy, Pennsylvania, the Seventh Day German Baptist Community at Ephrata, Pennsylvania; the more recently organized one, near Brocton in Western New York, which from the past history of Rev. T. L. Harris, one of its founders, we suppose to be Spiritualistic, and one in Iowa, which admits only male members.

II. Another and more numerous sect of PERFECTIONISTS, though, perhaps, we should hardly call them a sect since they have very generally retained their connection with the denominations to which they had previously belonged, are those persons, who in connection with Methodist, Congregationalist, Baptist, and Adventist Churches, hold to the doctrine that it is not only possible to attain, but that they have actually attained to a condition of sinless perfection, complete freedom not only from sinful acts



and deeds but from all sinful thoughts or words and from any promptings to sin. This doctrine, sometimes called the doctrine of Perfect Holiness, sometimes Oberlinism, since it was strongly advocated at Oberlin, Ohio, has a considerable following; and under the names of "The Higher Christian Life," or "Complete Sanctification," has been largely preached and written about within a few years past. We cannot say that in our experience, those who professed it have generally given evidence of greater purity or real holiness than others who made no such exalted profession; but while conformity to the Divine model is a thing to be sought after and labored for, we do not believe it is often attained in this life.

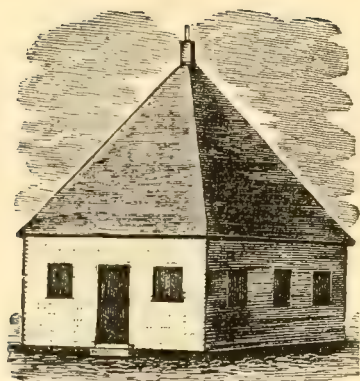
With our notice of these believers in Perfection we close our sketch of Religious Denominations in America. We may have omitted some small sects, but if so, it has not been for want of careful search for them. We have not deemed it necessary to say anything of Mohammedans, Buddhists, or

Sintauists, though we believe there are two or three congregations of each in California, and perhaps one or two in New York. The Russo-Greek Church has a chapel in New York City, one in San Francisco, and one or two in Alaska, but its adherents are probably less than 500 in all. The religious rites and ceremonies of the Indian tribes of the West, vary too much to be described within our limits. The Pueblo Indians of New Mexico, and the small remains of the Toltec tribes still found in New Mexico and Arizona, yet maintain some forms of that Sun and Fire Worship which so clearly fixes their origin in the plains of Mesopotamia. In some sections of the South, the Negroes, and especially those who were natives of Western Africa, still maintain in secret the Fetich or O-be-ah Worship. In considering the nearly one hundred and fifty denominations here enumerated with their widely varying creeds, we find it as true now as in olden times, that "God made man upright, but he sought out many inventions."

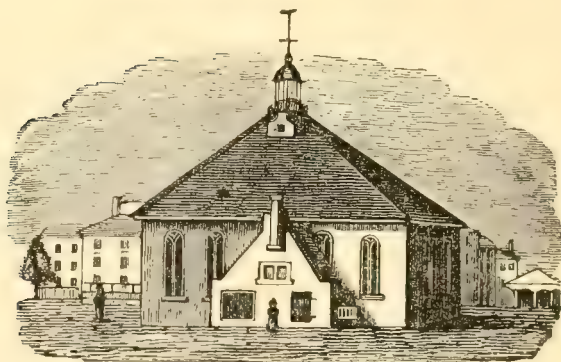
CHURCH ARCHITECTURE, PAST AND PRESENT, IN THE UNITED STATES.

IN connection with the preceding history of religious denominations in the United States, it seems appropriate that we should touch briefly on the edifices devoted to religious worship. During the Colonial period, and indeed till about 1820, the church edifices making any pretension to architectural beauty, were very few. One or two in Boston, two or three in New York, perhaps two in Philadelphia, one or two beside the Roman Catholic cathedral in Baltimore, one in Charleston, and one in Providence were so far beyond the ordinary churches in style and ornamentation that they were regarded as marvels. In the country, especially in the newer settlements, the church edifice, like the rude dwellings, was of logs, and the seats of hewed slabs, thrust between the logs at one end and sustained at the other by a block or some rough wooden legs. The pulpit was a section of the butt of a tree dug out and sometimes had a hewn slab pinned on it with wooden pins. The floor was oftenest of hard beaten

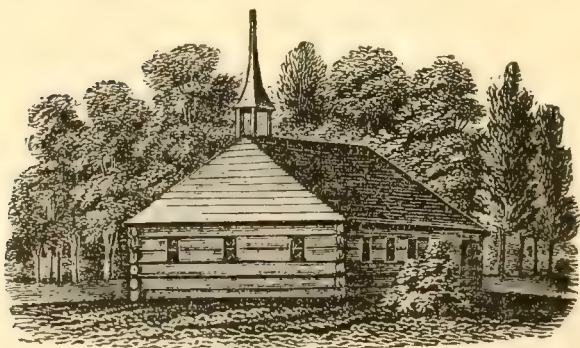
earth, but sometimes of split planks; the roof of bark or thatch and in rare cases of half-hewn logs with clay cement for the chinks. Glass in the windows was a rarity; oftener they were mere wooden shutters, admitting the light when thrown open but admitting, in their season, the wintry breezes also. There were no means of warming the house of God even when it was of better architecture than this, for two reasons: one that at this period stoves and furnaces were not in existence on this side of the Atlantic; the other that it was incompatible with the ideas of the fathers, that people should be allowed to take comfort in the house of God, except in the preaching of the Word. Was not the promise made on this very condition "If thou refrain thy foot from the Sabbath, from doing thine own pleasure on my holy day," &c., and did not that evidently mean that people should not go to a good comfortable church, nicely warmed and ventilated lest it should be a doing of their own pleasure?



First Church in Connecticut.

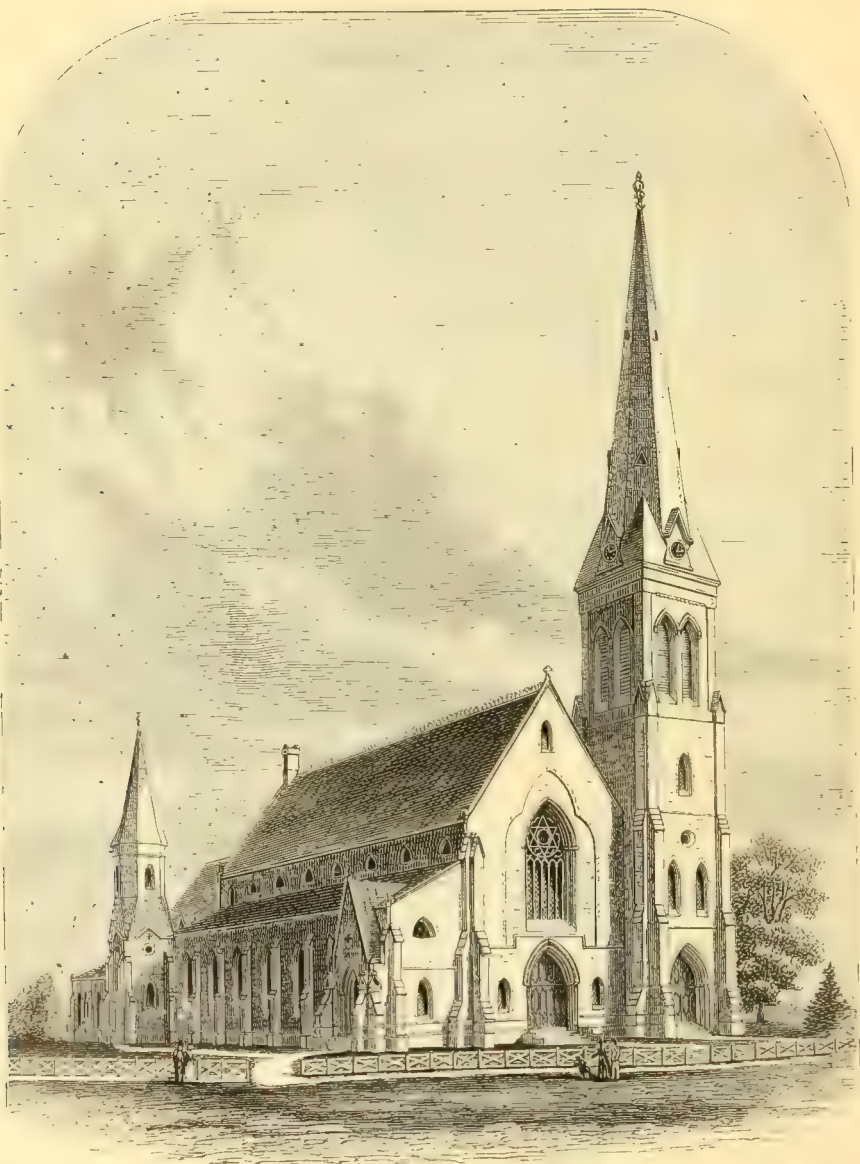


Ancient Dutch Church in Albany.



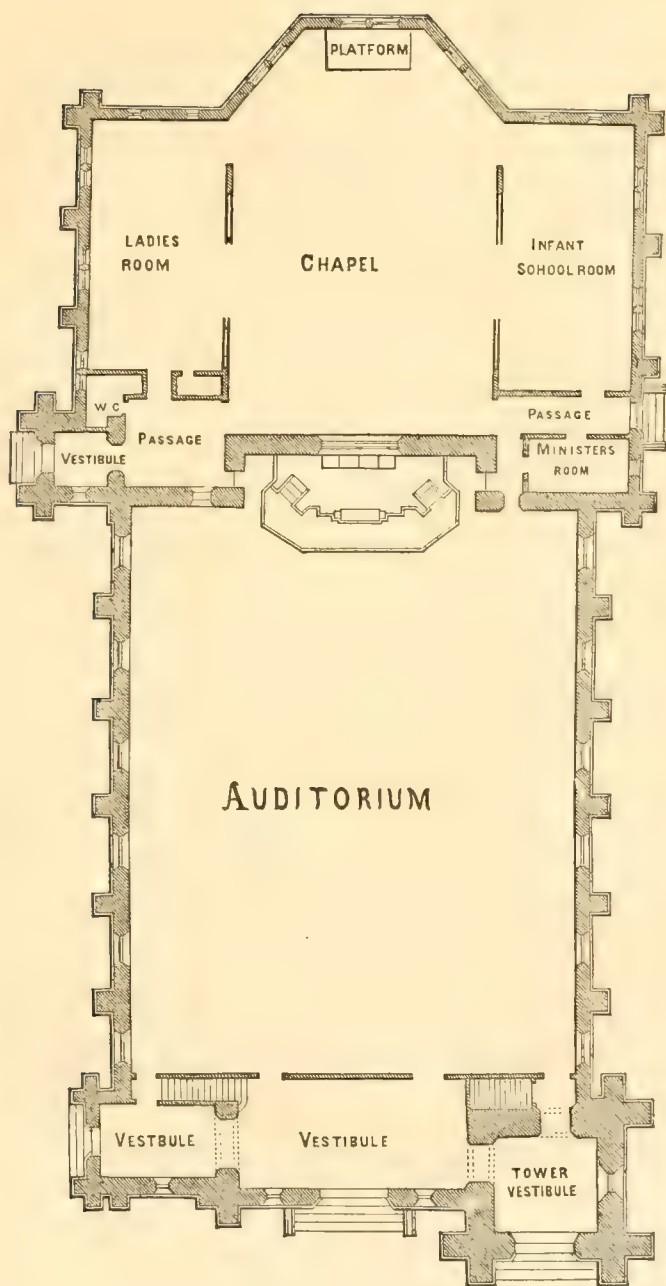
Ancient Swedes' Church, Philadelphia.

It is impossible to give anything like a general variety in modern styles of church edifices in our illustrations, they are so numerous; but the specimens of the old and new we here introduce, will give a good general idea of the improvements which have been made.



SOUTH CHURCH, NEW BRITAIN, CONN.

(Congregational)



PLAN.

They might get asleep if they were so comfortable. In the older settlements, the log cabin churches and school houses had given place to huge barn-like structures, lofty and bare and cold, with great square pews as large as the bed chambers of a modern dwelling, with high partitions, where each family sat by itself like the witnesses in a court, the jury in the jury-box, or, in many cases, like the criminal in his pen, when the judge is about to pronounce sentence on him. The mother or grandmother, in respect for their age and dignity, were allowed to bring their footstoves, little square boxes of perforated tin, having a little iron dish of live coals within them, and with these, while inhaling the charcoal fumes, they were fain to keep their feet from freezing in the winter; but the father, and the sons, and the little children were allowed no such foolish indulgence. After tramping through the snow perhaps for miles, they took their seats in their pews with the temperature anywhere from 32° to zero, and listened as well as they could, while the preacher read his discourse, going on often to seventeenthly or eighteenthly, while the children either played with the house dog, who was a regular attendant upon the church and had his place in the pew, or amused themselves with some of the few objects in which they could find occupation for their mental and physical activity. The number of panes of glass in the great windows were counted over and over again; the calculation was made with an elaboration of the doctrine of chances, worthy of a Babbage or De Morgan, how many weeks, months, or years would elapse before the huge sounding board over the pulpit would fall, and whether it would come down on the minister's head like an extinguisher on a candle, and whether the little tub perched on a post in which he preached would be crushed in the downfall. Occasionally a child of uncommonly quick perception would find some gratification, as the minister announced his "fifteenthly" and "sixteenthly" in computing how much time he would be likely to consume in the heads yet to come; but such an idea as a child's being able to understand what the minister was preaching about, never entered the heads of parent or minister. How should it? The sermons were mostly doctrinal, masterly expositions and logical arguments on the great points of the Calvinistic theology, but it required the matured minds of

the sturdy thinkers of those days to comprehend their force and pertinence. The sermons of that time were long; not merely an hour, but often two and three hours in duration. We read of one of the worthies of that time, a shining light in the Massachusetts ministry, that "he was a most godly and *painful* preacher" (don't laugh, reader, painful in those days meant painstaking); and that on one occasion he preached to his people a good three hours, in the morning of a very wintry day; and after they had taken food, he belabored them for their sins and shortcomings, in the afternoon, by the space of four hours more." In the cities, the churches were mostly frame buildings, though a few brick and stone were put up. One or two of the Dutch churches in New York were built of small red and black brick imported from Amsterdam, but very few had any architectural beauty. The Old Brick Church in New York, (Rev. Dr. Spring's) on Park Row, was in its day considered one of the finest churches in the city; if standing now it would hardly be considered a respectable stable (the use to which abandoned churches are generally put in that city). Indeed as late as 1830, forty-two years ago, there were not in the whole country twenty churches which could be considered specimens of graceful architecture. The great fire of 1835, which destroyed the second church edifice which the corporation of Trinity church had erected, as well as several other churches in that part of the city, was incidentally the impulse to great improvements in church architecture. The present Trinity church, "a poem in stone," was erected on the ruins of its predecessor, and Grace church soon after. From that time New York began to be noted for the beauty of its church edifices, many of them erected at enormous cost. Other cities followed the example; some, indeed, had already commenced the erection of beautiful churches. The Gothic styles, Early, Norman, Spanish, Mediæval, and English, were the favorites for many years, and even now have their advocates. Of late years, however, there has been a greater independence of the forms of Ancient and Mediæval art on the part of our architects, and while the styles of the Renaissance, and the ancient classical, are found more frequently than formerly, there is a desire which now and then finds expression in stone, iron, or bricks and mortar, to origin-

ate designs more appropriate to our own time, our climate and the new materials for building which we have. Sometimes this leads to very singular structures, experiments, it would seem upon public taste and endurance. Under the name of Italian Renaissance we have particolored buildings of red and cream-colored stone, or black and white marbles, with a profusion of spires, turrets, and finials, and crowned with a massive dome; in one of the so-called American styles we have broad, squat iron buildings, low, but crowned in the center with a high, towering dome, reminding one of a huge foundry. Another American style studiously plain, and undoubtedly capacious and comfortable for accommodating an audience, seems intended for two towers, whereof one is cut short at the height of the ridge-pole of the church, and the other forgetting its original intent presently shoots up into a lofty spire (usually of wood, but covered with slate) so slender and fragile, that it seems most like a monster darning-needle, set up on end. But these partial failures only serve as waymarks to a more perfect architecture which shall in the end attract the attention of the world by its grace and adaptation to the purposes for which it is intended. City churches are not as yet all models of beauty, but they are improving in these respects very rapidly. In their interior arrangement there has been a great advance. The old-fashioned pew has been banished and the modern slip or cushioned seat, low, easy, readily accessible and attractive has taken its place. The pulpit

is not now a perch or eyrie from which the preacher can get a bird's eye view of his congregation, but a simple reader's desk on a raised platform. Pillars are either entirely dispensed with or are so small as not to interfere with the view of the pulpit. Warming and ventilation have been the subject of anxious and protracted thought, and though we can hardly say as yet that either is perfect, yet we are so rapidly approximating to perfection in these particulars, that the present generation will probably be able to realize it. The Sunday School and Bible Classes have come to be such important agencies in religious progress, that special accommodations are required and provided for them, usually in a separate building, but attached to the church. And so strong are the demands for social life in connection with the church, that most of the newer church edifices have their parlors, retiring rooms, ante-rooms, committee rooms, and many of them pastor's studies and church libraries in connection with the church edifices.

The churches in the country come up slowly to these improvements, and those of the Southern and Western States more slowly than those of the Eastern or Middle States; but the progress in all is encouraging. Still great as has been the advance of the last forty years, we are, as a nation, far behind most foreign nations in the number, the splendor, or the costliness of our temples for religious worship.

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The following Testimonials must convince the most sceptical person of the merits of this work. We do not remember of ever seeing a list of names attached to any publication in this country whose opinions are entitled to more confidence. They were not given hastily, without examination, as it required about one year to obtain them.

PUBLISHERS.

No. 1.

From A. JACKSON, D. D., President Hobart College, Geneva.

I have examined, as far as time would allow, your new work. I think it a very convenient book of reference, and a valuable addition to our statistical knowledge. I have already found it a very useful work to consult, and I gladly add it to our College Library, where it well deserves a place.

No. 2.

From C. NUTT, D. D., President of the Indiana State University, Bloomington, Ind.

I have examined your recently published work and from the examination I have been able to give it, I believe that it merits richly the highest commendation. The great variety and importance of the subjects, the felicitous style in which they are clothed, and their numerous and beautiful illustrations, render this work peculiarly attractive. They embrace subjects of great and universal utility, and deeply interesting to all classes of community. Every profession and calling in life is here exhibited, with the latest improvements in every department of industry and art.

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From the President of the Wesleyan University, Middletown, Conn.

I have examined with much pleasure and profit your new work. It contains a great amount and variety of information, printed in an attractive style on subjects of the highest importance. It is eminently a practical work, and brings within the reach of all, stores of knowledge heretofore inaccessible to most readers. The novelty of the title, the great truths illustrated and established, give it increased attractiveness and usefulness.

No. 4.

From President of Girard College, Philadelphia, Pa.

Dear Sir,—I have been interested and instructed by the perusal of your national work, for a copy of which I am indebted to your courtesy.

An illustrated history of the various branches of industry and art in the United States, prepared with the ability and truthfulness which character-

izes this work, will be highly acceptable to all classes of readers. In its artistic and mechanical execution, nothing has been left to be desired. I am not acquainted with any work in which so much reliable information on so great variety of subjects may be found in so small a compass. It is emphatically a book for the people.

Yours respectfully,

WILLIAM H. ALLEN.

No. 5.

From the President of Genesee College.

LIMA, November 6,

With as much care as my time would allow, I have examined the work published by Mr. Stebbins. It contains a large amount of valuable information, in just the form to be circulated widely among the people. It is in fact a brief and interesting history of our progress as a nation, in both science and the arts. I am willing that my name and influence should aid in its circulation.

J. MORRISON REED.

I fully concur in the above.

JAMES L. ALVISON,
Professor in Genesee College.

No. 6.

From the President of Marietta College, Ohio.

Dear Sir,—The work on the "*Development of the United States*" was received by mail a few days since. I have given much attention I could to it, and write you now, as I am expecting to be absent from home for some days.

The examination of this work has given me much pleasure. The idea of furnishing this most valuable knowledge in a comparatively small compass, was a most happy one. As a people we want information—reliable information. We need to know our own history, in art and science, as well as in government. The people of one section should know how those of others live—the progress of one should be made known to all.

The idea of the work you have undertaken seems to have been well carried out, as well as happily conceived. On a great variety of topics, in which all the people are interested, you have furnished a large amount of valuable information. All, except those of the lowest grade of intelligence, will avail themselves of the opportunity to secure this work, and, unlike many books, the more it is examined the more valuable will it seem. I anticipate for it a wide circulation.

No. 7.

From the President of the University of Rochester, N. Y.

I have looked over, somewhat hastily, your new work. The plan seems to me excellent, the idea of presenting in a short compilation the present state

and rate of progress of the various industrial arts is one which can not fail to be thought worthy. In general, the work seems to be successfully and correctly done.

No. 8.

From President READ, University of Wisconsin.

I have examined, with a pleasure I can hardly express in too strong terms, your new work on the United States. During the few days the work has been on my table it has saved me, in the examination of facts, labor worth many times the cost of the volume. For the school library, the business man, the scholar, or the intelligent family, it will be found a cyclopædia presenting, in a most interesting form, the progress of the various arts of civilized life during the period of our national existence. I most heartily recommend the work.

Very truly yours,

DANIEL READ.

No. 9.

From the President of Columbia College, N. Y.

Sir,—I thank you for the copy of your work on the "Progress of the United States," published by you.

It seems to me of great value as containing information of interest, more or less, to all, and not easily accessible, except to varied labor and research.

The idea, too, of illustrating national progress, not by war, nor annexation, nor diplomatic legerdemain, but by the advance in the institutions of learning, in useful inventions, in the growth of manufactures, agriculture, and commerce, in all the arts of peace, in morals and civilization, in the inner life, so to speak, of the people themselves, seems to me both original and founded in the true notion of progress.

Your obedient servant,

CH. KING,
Pres. of Columbia College.

MR. STEBBINS.

No. 10.

From the President of Tufts College.

January 27,

MR. STEBBINS: *Dear Sir*,—I was led to expect much from the title of your work, and resolved to give it a careful examination. I have been richly repaid for the time thus spent, in the great pleasure and profit I have derived from its perusal. Heartily thanking you for this generous contribution to generous knowledge, I trust you may reap a rich reward for your efforts.

JOHN P. MARSHALL.

No. 11.

From the President of Dartmouth College.

January 20,

L. STEBBINS, Esq.: *Dear Sir*,—I received some days ago your very handsome work, but have found leisure only within a day or two to examine its contents. Those persons who have been longest on the stage can best appreciate the amazing contrasts in the state of the country which you

describe, but one who, like myself, can recognize the history of half the period, can testify to the faithfulness and fullness of your exhibition of the growth and power of this great country.

Very respectfully yours,

O. P. HUBBARD.

No. 12.

From the President of Williams' College.

Dear Sir,—I have no hesitation in saying that the work proposed to be done has been well done. For those who wish a book of the kind, yours cannot fail to be the book.

Respectfully yours,

MARK HOPKINS.

MR. L. STEBBINS.

No. 13.

From Pres. WOOLSEY, Yale College, New Haven, Conn.

YALE COLLEGE, Nov. 15,

MR. L. STEBBINS: *Dear Sir*,—Your book is a good and useful one, but it is not my practice to recommend books.

Your obedient servant,

T. D. WOOLSEY.

No. 14.

COLLEGE OF NEW JERSEY, }
PRINCETON, Jan. 28,

Dear Sir:—Your work I regard as a valuable publication, richly meriting the attention of the general reader, as well as the more careful examination of the student interested in observing the advancement of our country in the useful arts and learning.

Very respectfully yours,

JOHN MCLEAN.

L. STEBBINS, Esq.

No. 15.

From Rev. Dr. SMITH, Lane Theological Seminary, Ohio.

MR. L. STEBBINS: *My Dear Sir*,—I have run my eyes with great interest over your beautiful work. It contains, in a condensed yet attractive form, a mass of information touching the progress and present condition of our country. It is, moreover, information, of which every man, at some time, feels the need; and it would be a grand contribution both to the intelligence and patriotism of our whole population, if you could succeed in placing a copy of it in every family of the land. I shall place your book on my table for constant reference.

Wishing you all success in your enterprise,

I am very truly yours,

HENRY SMITH,

Prof. Ch., Hist. and Sac. Rhetoric.

No. 16.

From Professor FOWLER, of Amherst College, Editor of the University Edition of Webster's Dictionary, Series of Classical Books, etc.

The work which you placed in my hands I have taken time to examine, in order that I might learn its intrinsic value. I find that the subjects selected are such, and the manner of treatment such, as to supply a felt want in the public mind, which, in its own progress, was demanding higher and better

help than it enjoyed before the publication of your work. This might be inferred from the bare mention of the subjects and the authors. These subjects are treated by these writers with that correctness of the statement of the general principles, and with that fulness of detail which make the work just what it ought to be as a guide to the people. Every young man who wishes to elevate his mind by self-culture, ought to read this work carefully.

Yours respectfully,
WILLIAM C. FOWLER.

No. 17.

From Professor B. SILLMAN, Yale College, New Haven, Ct.

I have carefully looked through your rich and faithful work, observing the copious tables of contents, glancing at every page of the work, and at all the numerous illustrations, with occasional reading of paragraphs. A more thorough examination it has not been hitherto in my power to make; but even this general survey has left on my mind the decided conviction that you have performed an important service to your country in thus mapping out and condensing and explaining the wonderful progress made in this country, in all the most important arts of life.

B. SILLMAN.

No. 18.

From the Secretary of Board of Trade, Philadelphia.

L. STEBBINS, Esq.: *Dear Sir*,—I examined with interest the volume published by you, and found it particularly valuable. The design struck me very favorably, and the execution of the several parts could not have been intrusted to more competent hands. The last one hundred years of the history of the United States has been one of unexampled progress, and it is now more than ever important to bring in review before the people of every section the leading facts of this marvelous progress.

Very respectfully yours,
LORIN BLODGET.

No. 19.

From the Secretary of the Board of Trade, Boston.

My Dear Sir,—I have found time to acquaint myself with the general topics and objects of the work, and do not hesitate to declare that I have not read more interesting pages for years. Indeed, the best informed among us, cannot, as it seems to me, fail to find much that is new, while to the young and to those who lack the means of research, so authentic and well-digested account of our country's "Progress," will be of immense service. We all boast of our wonderful march in commerce, in manufactures, in mechanics, and in the arts; and here we have it, step by step, in "facts and figures," and in brief and pithy narrative.

With all my heart I hope that the sale will be extensive, and that you may be well rewarded for your outlay of time and capital.

Very truly, your friend,
LORENZO SABINE.

L. STEBBINS, Esq., Hartford, Conn.

No. 20.

From WM. W. TURNER, Principal of the American Asylum for Deaf and Dumb, Hartford, Conn.

I have examined your new national work on the "United States," and find that the information it

contains on the wide range of subjects treated of must make it exceedingly valuable as a standard book of reference. The names of the writers of the different articles afford a sufficient guaranty that the facts and statements may be relied on as correct. I consider the work a very important accession to this department of literature, and have no doubt that it will find its way into the library of every private gentleman and every public institution.

Very truly yours,
WM. W. TURNER.

No. 21.

From JOHN D. PHILBRICK, Superintendent Common Schools, Massachusetts.

I have examined your work with great satisfaction. I consider it a work of great value, and it is one which I should be very unwilling to spare from my library. It is not only such a book as the literary or professional man would like to possess, but it is a book for every household, and for every school library.

Very truly yours,
JOHN D. PHILBRICK.

No. 22.

From the Secretary of Board of Education.

BOSTON, MASS., Sept. 6,

Dear Sir,—I beg leave to thank you for your noble work.

After such an examination as I have been able to give, I do not hesitate to pronounce it a work of unusual interest and value.

As a depository of facts illustrative of the progress of our country in the departments of industry, it is invaluable.

Its wide circulation, at this eventful period, cannot fail to arouse and deepen that patriotic love of our institutions which is the pressing demand of the hour.

Respectfully yours,
J. WHITE.

L. STEBBINS, Esq.

No. 23.

From S. S. RANDALL, City Superintendent Public Schools, New York.

MR. L. STEBBINS: *Dear Sir*,—The great press of official engagements has hitherto prevented my acknowledgment of the receipt of the very beautiful and interesting work published by you. I have not had time to peruse them thoroughly, but take great pleasure in stating that, so far as I have looked into them, the plan and general execution of the work seem to me to be admirable, and well adapted to the wants, as well of the rising generation, as of our fellow-citizens generally. I cheerfully recommend it to the favorable regard of school officers, parents, teachers, and others, as a very valuable compend of scientific and historical knowledge, and as a work well worthy of a place in every school or private library.

No. 24.

From R. G. DANA, Mercantile Agency, New York.

From a cursory glance at its contents I feel warranted in saying it possesses information of much value and usefulness to all classes.

Very respectfully, R. G. DANA.

No. 25.

From B. J. LOSSING, the Historian.

Sir,—I have examined, with great satisfaction, your work. It is a work of inestimable value to those who desire to know, in minute detail, something more of the history of the country than the events of its political and industrial life as exhibited in the politician's manual, and the bold statements of the census; especially at this time, when the civilized world is eagerly asking what we are and what we have been, that the old governments may attempt to solve the more important question, to them, what we *will* be. Your work, in fact and logical prophecy, furnishes an answer of which any people may be justly proud. Surely, no nation of the earth has ever experienced such bounding progress as this. No American can peruse your pages without feeling grateful for the privilege of being an American citizen.

I will use a very true phrase and say, with all sincerity, I wish your work could go "into every family in our land," to increase their knowledge and to strengthen their patriotism.

Yours respectfully,
BLISSON J. LOSSING.

No. 26.

Office of Superintendent of Public Schools, Chicago.

The work which you have prepared with so much care and labor, presenting the progress of our country, is peculiarly adapted to gratify and instruct all classes of citizens. No work could be offered to the public at the present time more worthy of a place in family libraries, and school libraries, than the one which you now present.

Yours truly, W. H. WELLS,
Sup. of Public Schools.

No. 27.

From ISAAC FERRIS, D. D., Chancellor of the University in New York.

I have looked into the work and am happy to unite with the worthy men who have examined it, in commending it to my friends.

NEW YORK. ISAAC FERRIS.

No. 28.

From J. M. MATHEWS, D. D., Ex-Chancellor of the University in New York.

The object of the work is highly commendable; and, so far as I have been able to examine it, has been executed with ability and fidelity. I freely commend it to public patronage.

NEW YORK. J. M. MATHEWS.

No. 29.

From Prof. E. W. HOSFORD, of Cambridge University.

It is a work of very great value for popular reference. The articles having been prepared by writers who have made specialties of the subjects upon which they have written, are, as a consequence, eminently attractive. I find them an unfailing source of valuable information and important suggestion.

No. 30.

From the New York Times.

If at all inclined to doubt that a great deal of useful information may be bound up in a comparatively small compass by a judicious compiler, in the very handsome work before us, we should find sufficient logic to make us devout believers. The writers have ranged through the wild fields of

agriculture, commerce, and trade; very little that develops the material prosperity of a country, and marks its growth, has escaped their industrious research. Undoubtedly, minute criticism might detect slight errors, but in a work of so comprehensive a character, strict accuracy would seem almost unattainable. The statistics given are full and clearly arranged; the grouping of the subjects, and the evident method which the authors have observed in the accomplishment of their not inconsiderable task, are worthy of all praise. The work is one which we particularly need, as it is a lamentable fact that few people are so deficient in general knowledge of facts relative to growth and development of their native country, as ours. The Englishman generally has an arsenal of statistics at his fingers' ends; he can tell you when the first shaft was sunk in the first mine; when the first loom was erected in Manchester. The panoply of facts in which he is arrayed makes him rather a ponderous and far from sprightly companion, at times; but then he always proves formidable as an adversary. Germans, too, have nearly everything by rote that relates to their own country.

No. 31.

From the New Englander, New Haven, Conn.

In this very large octavo work there is presented in a compact and easily accessible form an amount of valuable information with regard to the progress which the people of the United States have made in all the various channels of industry since the days when they were British colonists, which is not to be found in any other single work with which we are acquainted. Each one of these subjects is amply illustrated with engravings. The different chapters have been prepared by well-known literary men who have each made the subjects about which they have written the study of years. We have examined the work repeatedly and with much care during the past three months, and each time have been impressed anew with its value. There is not an intelligent family in the nation who would not be interested and instructed by it, and find it a most convenient book of reference with regard to everything pertaining to the industrial interests of the country.

No. 32.

From the Boston Transcript.

This work is the result of much careful research, exercised by many minds on a variety of important subjects. They show the industrial and educational steps by which the people of the United States have risen from their colonial condition to their present position among the nations of the world. They give, in a historical form, the progress of the country in agriculture, commerce, trade, banking, manufactures, machinery, modes of travel and transportation, and the work is intended to be sold by subscription, and will doubtless have a large circulation. It ought to be in every house in the land. It is more important than ordinary histories of the country, as it exhibits all the triumphs of the practical mind and energy of the nation, in every department of science, art, and benevolence. It is a storehouse of important and stimulating facts, and its interest can hardly be exhausted by the most persistent reader.

TABLES OF POPULATION.

TABLE OF THE POPULATION,

VALUATION OF REAL AND PERSONAL ESTATE, CAPITAL INVESTED IN MANUFACTURES, TRADE, AND COMMERCE IN EACH OF THE STATES OF THE UNION.

M., manufacturing capital; T., capital employed in trade; C., capital employed in commerce by land and sea. The valuations are generally actual, and not assessment valuation. If not correct, they are from the best data and authority available.

STATES.	Population by census of 1870.	Valuation of real estate in 1870.	Valuation of personal estate in 1870.	Capital invested in manufactures, trade, or commerce, in 1870.
Maine.....	620,423	\$219,666,504	\$169,037,423 M,	\$48,000,000
New Hampshire.....	317,710	160,315,680	128,711,143 M,	53,500,000
Vermont.....	330,582	138,627,143	85,744,627 M,	37,823,000
Massachusetts.....	1,457,351	1,038,083,415	803,085,988 M,	250,000,000
Rhode Island.....	217,886	233,758,000	56,483,713 M,	45,000,000
Connecticut.....	637,856	312,574,408	135,380,750 M,	169,800,000
New York.....	4,730,846	2,532,720,907	2,434,270,278 C & M,	3,200,000,000
New Jersey.....	903,044	573,000,000	278,000,000 M,	135,000,000
Pennsylvania.....	3,511,543	1,046,782,062	340,891,498 C & M,	1,320,000,000
Delaware.....	175,015	47,385,614	20,185,693 M,	16,550,000
Maryland.....	790,095	308,891,449	327,937,008 M & C,	117,500,000
Virginia.....	1,211,442	885,000,000	85,000,000 M & T,	86,230,000
West Virginia.....	441,943	98,780,000	41,000,000 C,	28,000,000
North Carolina.....	1,016,954	203,837,993	188,331,290 M,	15,000,000
South Carolina.....	705,789	358,785,191	219,681,837 M & T,	35,500,000
Georgia.....	1,174,836	386,129,231	267,825,641 M & T,	51,325,000
Florida.....	184,965	16,320,103	15,447,680 M & C,	13,000,000
Alabama.....	996,175	327,500,000	125,500,000 M & C,	45,000,000
Mississippi.....	843,056	177,000,000	49,300,000 M & T,	21,300,000
Louisiana.....	731,420	317,612,583	294,861,247 C,	48,000,000
Texas.....	795,500	298,163,241	159,328,216 M & T,	27,480,000
Arkansas.....	486,103	86,297,123	127,261,326 M & T,	13,287,000
Tennessee.....	1,258,326	276,163,137	168,237,191 M & T,	79,500,000
Kentucky.....	1,323,264	329,218,742	271,864,165 T,	256,000,000
Ohio.....	2,676,468	1,607,418,203	959,762,252 C,	2,300,000,000
Indiana.....	1,068,460	937,201,283	367,180,625 C,	1,400,000,000
Illinois.....	2,567,036	1,346,587,734	342,407,041 C,	2,000,000,000
Missouri.....	1,725,658	805,893,165	497,487,635 C & M,	1,720,000,000
Kansas.....	379,497	69,125,000	31,285,900 T,	114,000,000
Nebraska.....	116,898	24,160,000	30,895,796 M,	6,600,000
Iowa.....	1,181,359	322,561,071	171,971,191 M & C,	325,000,000
Michigan.....	1,184,653	387,246,120	183,284,721 C & M,	387,642,000
Wisconsin.....	1,055,501	310,000,000	138,000,000 M,	32,000,000
Minnesota.....	424,543	171,155,000	29,387,000 M,	14,831,000
Nevada.....	44,686	19,360,000	14,200,000 M,	3,325,000
California.....	556,208	217,855,933	128,725,471 C & M,	150,000,000
Oregon.....	90,878	29,830,117	19,187,323 M,	11,350,000
District of Columbia.....	131,706	83,127,841	49,287,605 M & T	19,270,000
Territories.....	298,327	79,184,811	52,329,613 M,	21,832,000
	33,881,231			

TABLE OF PRINCIPAL CITIES OF THE UNITED STATES,

SHOWING POPULATION IN 1850, 1860, AND 1870, CAPITAL INVESTED IN MANUFACTURES, AND AMOUNT OF ANNUAL PRODUCT IN OR NEAR 1870.

CITIES.	State.	Population in 1850.	Population in 1860	Population in 1870.	Capital invested in manufactures in or near 1870.	Annual product.
Portland.....	Maine.	20,915	26,341	30,877	\$7,500,000	\$13,340,000
Bangor.....	"	14,432	16,407	18,295	5,800,000	12,000,000
Lewiston.....	"	3,384	.....	13,600	6,300,000	11,500,000
Biddeford.....	"	6,095	.....	10,285	3,000,000	7,000,000
Augusta.....	"	8,225	7,609	7,811	5,000,000	10,500,000
Manchester.....	N. H.	13,932	20,109	23,536	9,640,000	19,970,000
Nashua.....	"	6,820	10,065	10,543	6,100,000	12,350,000
Portsmouth.....	"	9,738	9,331	9,305	1,500,000	3,000,000
Concord.....	"	8,576	10,836	12,241	6,700,000	10,500,000
Dover.....	"	8,136	8,302	9,294	3,200,000	5,800,000
Burlington.....	Vt.	6,110	7,713	14,387	1,725,000	4,800,000
Boston.....	Mass.	136,881	177,812	250,524	42,000,000	105,000,000
Lowell.....	"	33,333	36,827	40,928	30,000,000	89,000,000
Worcester.....	"	17,049	24,960	41,105	8,800,000	26,000,000
Salem.....	"	20,264	22,252	24,117	3,500,000	9,875,000
Cambridge.....	"	15,215	26,060	33,634	5,000,000	14,000,000
New Bedford.....	"	16,483	22,300	21,320	24,000,000	37,000,000
Fall River.....	"	11,524	14,026	26,781	13,400,000	29,500,000
Springfield.....	"	11,766	15,199	26,704	8,350,000	17,284,000
Charlestown.....	"	17,216	15,063	28,323	7,100,000	16,250,000
Newburyport.....	"	9,572	13,401	13,593	2,500,000	6,000,000
Taunton.....	"	10,441	19,376	18,629	8,950,000	19,675,000
Lynn.....	"	14,257	19,803	28,233	10,250,000	15,187,350
Gloucester.....	"	7,786	10,904	15,349	1,750,000	4,225,000

TABLES OF POPULATION.

TABLE OF PRINCIPAL CITIES OF THE UNITED STATES.—CONTINUED.

CITIES.	State.	Population in 1850.	Population in 1860.	Population in 1870.	Capital invest- ed in manu- factures in or near 1870.	Annual pro- duct.
Holyoke.....	Mass.	3,245	.....	11,000	\$7,185,000	\$13,267,000
Lawrence.....	"	8,282	.....	28,921	20,000,000	35,000,000
Providence.....	R. I.	41,513	50,666	68,906	11,837,648	33,600,000
Newport.....	"	9,563	10,508	12,521	1,500,000	3,275,000
New Haven.....	Conn.	20,345	39,267	50,840	12,715,000	32,000,000
Hartford.....	"	13,555	29,154	37,180	13,500,000	31,300,000
Bridgeport.....	"	7,500	13,555	13,876	5,125,000	17,500,000
Norwich.....	"	10,235	14,048	16,653	7,675,000	18,250,000
Middletown.....	"	4,211	.....	11,143	1,775,000	4,000,000
New London.....	"	8,901	10,115	9,576	2,500,000	4,865,000
Waterbury.....	"	5,137	.....	10,825	8,125,000	19,385,000
Meriden.....	"	3,559	.....	10,521	2,784,000	8,500,000
New York.....	N. Y.	515,547	805,651	942,310	179,525,000	486,125,000
Brooklyn.....	"	96,838	236,661	306,300	65,500,000	140,225,000
Buffalo.....	"	42,281	81,129	117,715	27,965,000	62,835,000
Albany.....	"	50,763	62,337	69,422	18,250,000	41,375,000
Rochester.....	"	36,403	48,204	62,335	15,000,000	28,000,000
Syracuse.....	"	22,271	24,119	49,058	11,871,500	29,627,000
Troy.....	"	28,785	39,232	46,471	9,900,000	20,000,000
Yonkers.....	"	4,130	11,848	18,318	1,250,000	3,100,000
Oswego.....	"	12,257	16,817	20,910	5,108,000	13,187,000
Hudson.....	"	6,236	9,288	14,135	1,125,000	2,750,000
Utica.....	"	17,535	22,529	28,804	6,225,000	14,861,000
Binghamton.....	"	5,000	8,325	12,862	2,725,000	5,895,000
Morrisania.....	"	.....	9,245	19,637	3,184,000	7,196,000
Poughkeepsie.....	"	13,944	11,726	20,080	4,932,000	10,287,000
Cohoes.....	"	4,229	7,620	15,357	5,550,000	11,250,000
Newburgh.....	"	11,415	15,196	17,014	3,725,000	7,810,000
Elmira.....	"	8,163	8,892	15,863	6,817,000	14,271,000
Lockport.....	"	10,327	13,533	15,453	2,165,000	5,125,000
Schenectady.....	"	8,921	9,579	11,026	1,125,000	2,789,000
Auburn.....	"	9,548	10,386	17,225	5,075,000	12,173,000
Ogdensburg.....	"	6,500	7,409	10,076	3,187,500	7,785,000
Newark.....	N. J.	34,891	71,914	105,078	25,500,000	53,628,000
Jersey City.....	"	6,853	29,226	82,102	18,650,000	35,750,000
Elizabeth.....	"	5,583	10,000	20,383	1,725,000	2,850,000
Paterson.....	"	11,334	19,588	33,512	17,150,000	38,525,000
Hoboken.....	"	2,638	9,662	20,254	3,330,000	8,200,000
Rahway.....	"	3,906	4,785	6,016	530,000	1,050,000
Trenton.....	"	6,461	17,228	22,115	7,100,000	15,125,000
New Brunswick.....	"	10,019	12,150	15,659	2,785,000	5,875,000
Camden.....	"	9,473	11,267	20,045	5,650,000	12,175,000
Hudson City.....	"	.....	18,000	.....	490,000	1,750,000
Philadelphia.....	Pa.	340,045	562,529	674,022	178,000,000	495,000,000
Pittsburgh.....	"	46,901	49,217	95,235	69,250,000	141,500,000
Allegheny City.....	"	21,261	28,775	53,181	21,300,000	54,380,000
Scranton.....	"	.....	9,223	33,093	2,617,000	6,285,000
Reading.....	"	15,743	23,161	33,932	9,755,000	38,124,000
Harrisburg.....	"	7,834	13,405	23,109	6,125,000	13,250,000
Erie.....	"	6,858	9,419	20,500	1,500,000	4,000,000
Lancaster.....	"	12,339	17,603	20,233	3,900,000	9,728,000
Wilmington.....	Del.	13,979	25,578	30,841	11,500,000	18,000,000
Baltimore.....	Md.	169,054	212,418	267,354	27,480,000	79,169,000
Cumberland.....	"	6,073	.....	11,500	400,000	2,500,000
Frederick.....	"	6,023	8,143	10,180	875,000	2,100,000
Washington.....	D. C.	40,001	61,122	109,294	3,150,000	10,287,000
Georgetown.....	"	8,366	8,733	12,412	1,000,000	2,650,000
Richmond.....	Va.	27,570	37,910	51,038	2,100,000	5,188,000
Alexandria.....	"	8,734	12,652	13,570	3,125,000	8,749,500
Norfolk.....	"	14,326	25,611	19,256	2,087,500	5,964,250
Portsmouth.....	"	8,122	9,502	12,678	1,499,350	3,748,140
Petersburg.....	"	14,010	18,266	14,128	500,000	1,150,000
Lynchburg.....	"	8,071	6,853	7,319	350,000	975,500
Wheeling.....	W. Va.	11,435	14,083	19,582	6,150,280	14,297,340
Wilmington.....	N. C.	7,264	9,552	13,465	975,000	2,500,000
Raleigh.....	"	4,518	4,780	10,146	400,000	1,100,000
New-Berne.....	"	4,681	5,432	4,996	250,000	725,000
Charleston.....	S. C.	42,985	40,522	4,956	1,850,000	3,950,000
Columbia.....	"	6,000	8,059	10,139	1,015,250	2,416,980
Savannah.....	Ga.	15,312	22,292	20,233	500,000	1,100,000
Atlanta.....	"	2,572	9,554	16,988	1,325,000	3,145,000
Augusta.....	"	11,753	12,493	14,197	575,000	1,497,500
Key West.....	Fla.	1,943	2,332	6,510	550,000	1,328,500
Mobile.....	Ala.	20,515	29,258	32,084	3,618,000	9,145,320
Montgomery.....	"	4,935	8,843	13,065	500,000	3,000,000
Natchez.....	Miss.	4,434	6,612	9,123	275,000	785,300
Vicksburg.....	"	3,678	4,591	8,938	729,000	1,541,870
New Orleans.....	La.	116,375	168,675	191,322	19,750,000	63,550,000
Galveston.....	Texas.	4,177	7,307	13,818	850,000	2,100,000
Little Rock.....	Ark.	2,167	3,727	13,380	300,000	850,000
Memphis.....	Tenn.	8,839	22,623	40,226	1,639,000	3,741,500
Nashville.....	"	10,478	16,993	25,872	1,171,450	2,703,521
Knoxville.....	"	3,690	6,000	9,000	500,000	980,000

TABLES OF POPULATION.

TABLE OF PRINCIPAL CITIES OF THE UNITED STATES.—CONTINUED.

CITIES.	State.	Population in 1850.	Population in 1860.	Population in 1870.	Capital invest- ed in manu- factures in or near 1870:	Annual pro- duct.
Louisville.....	Ky.	43,194	68,023	100,754	\$16,313,000	\$40,091,745
Covington.....	"	8,408	16,471	24,505	4,296,500	1,822,000
Lexington.....	"	9,130	9,521	16,121	600,000	1,527,000
St. Louis.....	Mo.	77,800	167,775	312,063	48,387,150	100,017,500
Kansas City.....	"	6,000	4,415	32,332	3,174,125	8,125,150
St. Joseph.....	"	5,000	8,932	19,632	1,675,225	4,075,425
Hannibal.....	"	2,020	6,545	10,120	1,000,000	2,200,000
Leavenworth.....	Kan.	.....	7,429	17,849	1,800,000	2,200,000
Topeka.....	"	.....	5,759	5,790	400,000	300,000
Omaha.....	Neb.	.....	1,883	16,038	.....	.....
Davenport.....	Iowa.	1,848	11,251	20,042	1,300,000	2,500,000
Dubuque.....	"	3,108	13,000	18,081	2,425,000	3,000,000
Des Moines.....	"	986	3,935	12,379	1,470,000	3,000,000
Rockford.....	"	2,478	8,131	12,754	925,000	2,000,000
Muskegon.....	"	2,540	5,231	10,178	850,000	1,977,000
Council Bluffs.....	"	2,000	2,011	1,957	1,125,000	2,000,000
Burlington.....	"	4,082	6,705	12,034	1,050,000	2,377,120
Chicago.....	Ill.	29,963	109,245	298,988	60,000,000	175,000,000
Peoria.....	"	5,095	10,261	20,787	4,105,000	11,100,000
Quincy.....	"	6,902	13,632	24,052	3,072,500	8,710,000
Springfield.....	"	11,766	15,100	17,365	1,980,300	3,018,500
Alton.....	"	3,585	7,388	10,353	1,147,618	2,801,150
Galesburg.....	"	6,004	8,103	10,030	2,261,419	4,810,383
Peoria.....	"	1,678	3,467	9,310	1,743,200	3,877,250
Rock Island.....	"	1,711	5,130	7,895	1,864,325	3,987,420
Caro.....	"	242	2,188	8,247	1,400,000	2,963,210
Indianapolis.....	Ind.	8,034	15,611	41,630	4,150,500	11,205,350
Evansville.....	"	3,235	11,484	21,830	2,745,200	7,189,150
Terre Haute.....	"	4,051	8,504	17,105	1,993,550	4,185,240
Fort Wayne.....	"	4,282	10,338	17,756	1,871,000	4,000,000
New Albany.....	"	.....	12,447	16,205	2,343,750	4,918,255
Lafayette.....	"	1,215	9,387	14,312	820,000	2,000,000
Madison.....	"	8,012	9,068	10,709	1,361,000	3,100,000
Richmond.....	"	1,443	6,003	9,443	2,628,133	5,155,281
Logansport.....	"	354	2,979	8,950	1,901,822	3,000,100
Cincinnati.....	Ohio.	115,433	161,044	218,900	58,340,000	179,270,040
Cleveland.....	"	17,024	41,117	99,918	44,000,000	127,375,500
Toledo.....	"	3,820	13,706	31,692	5,250,000	14,128,500
Columbus.....	"	17,882	18,602	23,333	8,325,000	10,000,000
Dayton.....	"	10,970	20,081	30,867	6,240,325	14,371,225
Sandusky.....	"	10,000	9,316	14,523	2,116,687	4,000,000
Springfield.....	"	7,311	7,007	12,000	3,000,000	5,200,000
Hampton.....	"	3,210	7,227	11,165	4,128,575	12,006,155
Portsmouth.....	"	4,011	6,273	10,522	1,817,340	4,000,000
Steubenville.....	"	6,144	6,157	10,207	2,106,150	5,210,265
Zanesville.....	"	7,329	9,232	10,013	2,819,325	6,173,124
Akron.....	"	3,231	3,520	10,010	2,687,640	6,031,240
Detroit.....	Mich.	21,019	45,019	70,788	18,380,000	52,185,000
Grand Rapids.....	"	3,117	8,035	15,505	2,725,000	5,918,000
Jackson.....	"	4,117	4,700	11,448	1,976,500	4,128,000
Kalamazoo.....	"	3,214	6,070	9,180	1,750,000	3,710,500
East Saginaw.....	"	500	3,000	11,330	2,508,000	5,000,000
Albion.....	"	3,043	6,213	8,418	1,843,500	4,103,000
Milwaukee.....	Wis.	20,000	45,000	71,000	11,275,000	28,045,000
Madison.....	"	3,400	6,611	10,000	2,193,750	4,885,000
Oshkosh.....	"	2,500	6,000	12,000	.....	.....
Superior City.....	"	.....	7,000	1,000	650,000	1,384,000
Fond du Lac.....	"	2,011	5,100	12,771	.....	.....
Green Bay.....	"	1,923	7,000	4,000	425,000	594,000
Kelley.....	"	5,107	7,800	9,800	.....	.....
Janesville.....	"	3,451	7,000	8,791	879,000	2,155,000
St. Paul.....	Minn.	1,338	10,000	20,645	1,312,250	3,100,000
Winona.....	"	.....	2,494	10,000	250,000	722,000
St. Anthony.....	"	656	3,258	6,000	575,600	1,607,833
Minneapolis.....	"	.....	2,564	16,000	1,525,000	3,200,500
Denver.....	Col.	.....	4,749	9,500	850,000	1,795,000
Cheyenne.....	Wyo.	.....	.....	4,500	550,000	1,600,000
Salt Lake City.....	Utah.	8,000	8,200	24,500	1,600,000	4,280,000
Carson City.....	Nev.	.....	714	4,875	200,000	450,000
Virginia City.....	"	.....	2,345	7,008	450,000	1,000,000
San Francisco.....	Cal.	34,776	56,802	158,361	28,500,000	71,470,000
Sacramento.....	"	12,000	13,785	16,481	1,245,000	3,700,000
Stockton.....	"	3,000	3,079	3,825	250,000	700,000
Oakland.....	"	.....	6,710	27,000	270,000	800,000
Portland.....	Oregon.	827	1,543	8,293	1,295,000	2,772,000
Steilacoom.....	"	.....	2,874	3,800	121,500	306,000
Olympia.....	Wash. T.	.....	.....	1,500	50,000	150,000
Santa Fe.....	New Mex.	4,846	4,635	5,600	110,000	250,000
Tucson.....	Arizona T.	.....	1,034	2,000	100,000	470,000
Boise City.....	Idaho.	.....	.....	4,800	185,000	500,000
Helena.....	Montana.	.....	.....	8,900	370,000	800,000
Virginia City.....	"	.....	.....	3,700	925,000	2,500,000
Yankton.....	Dakota.	.....	458	5,800	225,000	560,000

TABLES OF POPULATION.

COMPARATIVE POPULATION OF THE LARGEST CITIES OF THE UNITED STATES.

Cities.	State.	Settled.	Years.	1790.	1800.	1810.	1820.	1830.	1840.	1845.	1850.	1860.	1870.
Portland	Maine				3,677	7,169	8,581	12,701	15,215		20,415	28,311	30,877
Portsmouth	N. H.			4,720	6,989	6,994	7,827	8,682	7,887		9,358	9,355	9,355
Manchester	N. H.								3,484		13,132	20,119	23,836
Boston	Mass.		1722, 10,667 1785, 16,620	13,038	24,937	33,220	43,298	61,392	133,881	114,990	136,881	177,812	250,525
Lowell	Mass.							6,474	20,746	28,841	33,393	36,827	40,928
Springfield	Mass.					2,767	3,914	6,784	10,956		11,466	18,199	21,763
Salem	Mass.		1637, 900 1765, 4,427	7,921	9,457	12,613	13,781	13,882	15,082	15,792	20,764	22,272	24,117
Providence	R. I.	1635		6,380	7,614	10,071	11,767	16,532	23,171		41,613	68,096	98,906
New Haven	Conn.	1638			4,949	5,772	7,117	10,189	12,406		43,335	59,295	66,840
Hartford	Conn.	1635				8,855	4,723	7,676	9,438		16,559	29,164	37,159
New York	N. Y.	1612	1656, 1,000 1731, 8,028 1773, 21,876	33,131	60,489	96,373	123,706	202,689	312,710	371,223	615,547	805,667	912,310
Brooklyn	N. Y.				3,298	4,102	7,176	15,296	36,233	50,506	96,585	236,601	396,300
Albany	N. Y.			3,498	6,289	9,336	12,630	19,336	33,721	41,149	60,573	69,627	79,494
Rochester	N. Y.					1,568	2,065	8,653	18,213	29,778	42,231	81,129	117,715
Syracuse	N. Y.		1812, 15				1,562	9,289	20,191	25,265	36,433	48,294	62,365
Troy	N. Y.					3,895	5,264	11,405	19,334	21,709	28,785	39,232	46,471
Utica	N. Y.						2,972	8,323	12,782		17,535	27,739	48,901
Newark	N. J.						6,507	10,453	17,290	34,140	88,894	71,914	106,478
Philadelphia	Penn.	1682	1683, 600 1731, 12,000	42,520	60,403	91,874	112,772	161,410	220,423		810,045	632,529	674,022
Pittsburg	Penn.				1,575	4,768	7,248	12,568	21,115		46,091	49,217	86,235
Baltimore	Md.	1729		13,503	26,114	35,583	63,738	80,625	102,313		169,654	232,418	297,754
Washington	D. C.				3,210	8,198	13,247	18,827	23,394		40,001	61,132	109,294
Richmond	Va.	1742		3,761	5,575	9,735	12,067	16,060	20,153		27,570	37,910	51,098
Norfolk	Va.	1705				8,478	9,814	10,926	11,136		14,326	15,611	19,256
Petersburg	Va.				3,621	5,608	6,680	8,322	11,136		14,010	18,266	14,158
Wilmington	N. C.							3,600	4,744		7,264	9,552	13,465
Charlotte	S. C.	1672		16,369	20,473	24,711	21,780	20,389	29,291		42,985	40,578	48,956
Savannah	Ga.	1732			5,100	5,215	7,223	7,776	11,214		15,312	22,292	20,233
Mobile	Ala.		1785, *746 1788, *1,468				1,500	3,794	12,672		20,515	20,258	32,184
Nashville	Tenn.						5,556		6,929		20,478	16,988	25,872
Louisville	Ky.				359	1,337	4,012	10,311	21,270		43,114	68,033	100,754
Cincinnati	Ohio				750	2,540	9,942	21,331	46,388		113,436	161,044	218,970
Columbus	Ohio	1812							6,048		17,882	18,554	33,745
Cleveland	Ohio	1796							6,071		17,031	43,417	92,846
Detroit	Mich.						2,222	9,102	45,619		21,019	45,619	79,580
Chicago	Illinois	1831						4,853			29,933	100,200	208,983
St. Louis	Mo.	1764	1779, *891 1785, *897 1788, *1,197			1,069	4,508	5,852	16,469		77,860	160,773	312,963
New Orleans	La.	1717	1785, 4,980 1788, 5,231 1797, 8,056			17,242	27,176	46,319	110,193		116,375	168,675	191,322
San Francisco	Cal.										131,776	56,802	158,261
Milwaukee	Wis.								1,700		20,061	45,246	71,449

NOTE.—The year 1845 and the periods earlier than 1790 are taken from State enumerations, and from other sources of information.

* Population of the settlement.

† State census of 1852.

‡ Errors were made in Boston and New Orleans in 1840, underestimating the population in the first city, as proved by Mr. Shattuck, to the extent of about 8,000; and overestimating it in New Orleans, as proved by Dr. Barton, by at least 10,000 or 15,000.





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